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SURGERY IN ULCERATIVE COLITIS.[1]

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IT is necessary to state at the outset that the operations described for the treatment of colitis have been performed only after prolonged medical treatment and at the request of a consulting physician, and most of the patients have been under the care of Dr. L. Hurley, who has asked for surgical assistance in their management.

My first experience of surgery in ulcerative colitis goes back twenty years. A female patient of the late Dr. B. Kilvington was operated upon. Appendicostomy was performed, and one of my duties was to attend to the lavage of the bowel.

In the late 1930's I performed an ileostomy operation on a female patient (Miss S.) at the request of Dr. G. A. Penington and Dr. L. Hurley. In the following year her general condition had improved; yet rectal examination revealed such persistent ulceration that the physicians requested further surgical treatment. I removed the colon and the distal portion of the ileum, closing the rectal stump and leaving a permanent ileostomy. For ten years she has remained well, in contrast to her previous invalidism. She looks well, does her housework and enjoys life. Last year she was readmitted to hospital for examination of the rectal stump because of recent hæmorrhage. Superficial ulcers were seen and cauterized with silver nitrate. She was given some rectal washouts with dilute flavine solution. The rectum was stiff, its mucosa replaced by thin, almost transparent scar tissue. I advised her to continue as she was.

Anastomosis of the ileum to the scarred rectum would not help this patient, and excision of the rectum does not appear to be justified at present. However, it will need to be watched carefully, and if other pathological changes are observed, it will be excised.

During the war, I saw many patients die of perforation, hæmorrhage and toxic sequelæ of ulceration of the colon—the results of chronic untreated amœbic dysentery.

I performed my first ileostomy in such cases on a Dutchman at Tavoy prisoner-of-war camp late in 1942. He was at death's door at the time of the operation, but quickly responded to the defunctioning of the diseased colon. Wearing a Dutch water bottle as a container for the discharge, he later worked for me as a medical orderly. In 1945, after he had had a course of emetine, I closed the ileostomy opening. Occasional prolapse of the mucous membrane of the stoma occurred when he did the heaviest of work.

The value of ileostomy as a method of defunctioning the colon has been proved beyond doubt. The care of the skin and the general measures to render ileostomy life comfortable are dealt with by Dr. E. E. Dunlop.

Since returning to practice, I have been asked to operate upon ten patients suffering from ulcerative colitis. All have had preliminary ileostomy; I have subsequently performed a total colectomy on seven—one died. I have also had under my care two patients of the late Dr. Kilvington. Colectomy had been performed with anastomosis of ileum and rectum. Hæmorrhage occurred occasionally. This experience is meagre, but from it I have learnt certain lessons.

The Operation of Ileostomy.

I have performed thirty ileostomy operations and observed colleagues associated with me in prisoner-of-war camps performing the same operation. For various reasons, I consider that the double-barrelled ileostomy, carried out by the simplest technique, is the most suitable. The patients are very ill, otherwise they do not come to operation. The bowel is friable and easily perforated and should be handled as little as possible. The ileum is

[1] Read at a combined meeting of the Section of Medicine and the Section of Surgery, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

inflamed for variable distances. Closure of the distal end is time-consuming and there is a danger of leakage within the abdomen.

The amount of pus discharged from the distal cut end of the ileum in some cases reminds one that closure of such an infected structure is contrary to surgical principles.

Local, spinal or general anæsthesia may be used. In prisoner-of-war camps spinal anæsthesia was used, but at home I have used either local or general anæsthesia, according to the condition of the patient. Some patients had suffered severe blood loss and were intoxicated by the infection of the colon. In these cases, local anæsthesia was desirable. A standard operation similar to the one performed on Miss S. in 1938 was performed. An incision three inches long was made two inches lateral to the mid-line, two-thirds of it below the umbilicus. The rectus sheath and muscle were split, the peritoneum was opened and the ileo-caecal valve was picked up and the ileum examined. A point twelve to eighteen inches from the valve was chosen, according to the condition of the ileum, for the ileostomy. The mesentery was divided and ligated for one to one and a half inches, according to the thickness of the abdominal wall. The bowel was divided, after having been carefully packed off. A piece of rubber tube, preferably number 14 rubber catheter, was inserted into each cut end for a distance of three inches or more, and a cotton suture was put through the bowel and tube and tied around the bowel to make it watertight. The bowel with the contained tubes was replaced in the abdomen, the suture being left outside skin level. A catgut suture picked up the peritoneum and the stump of mesentery, and a gauze strip was then put in the wound down to the peritoneum. (It is not wise to suture the muscle, as it becomes too tight.) The proximal ileostomy stoma was placed in the distal end of the wound. Water was run into the proximal tube by tube and funnel until the return fluid was of good colour. That tube was then placed under water in a large bottle at the side of the bed. Frequently the drainage was slight for the first twenty-four hours, then bubbles of gas and bile-stained ileal contents came away. If abdominal pain of colicky nature was felt, the proximal ileostomy tube was attached to tube and funnel and washed out. The gauze and tubes were removed at the end of forty-eight hours, and either a Hamilton Irving box or a rubber bag was applied.

This simple operation is less likely to disturb the patient than the more elaborate procedures described by some. Firm sealing by exudate between the muscles and the peritoneum of the bowel is assured at the end of forty-eight hours. By that time, the tubes tend to become blocked, or kinking of a coil of ileum over the end of the tube causes mild obstruction. If the skin of the patient has been suitably hardened with "Tannafax" before operation, the erosion of the skin is minimal.

It is interesting to note how the ileal contents of these patients become pasty and semi-solid; thin colons have long ceased to carry out water absorption. Occasionally a suture of the skin at the top or bottom end of the wound is necessary to help to retain the gauze pack.

Before the ileostomy operation was performed, information was available from clinical, biochemical, bacteriological, radiological and sigmoidoscopic investigation. During the months following the operation, radiological and sigmoidoscopic examination should be repeated. Although the patient may appear well, pathological changes may be progressing in the diseased colon—for example, carcinoma.

For a few months there is usually a gain in weight, perhaps as much as two or three stone; then there may be a recurrence of hæmorrhage and copious discharge per rectum. Colectomy is indicated.

Preparation of the patient includes chemotherapy with the sulphonamide drugs, especially phthalylsulphathiazole, and probably a blood transfusion. The ideal anæsthesia is that produced with cyclopropane and curare. The use of the latter enables the surgeon to obtain a good exposure in the upper recesses and to work in a minimal incision.

The Operation of Colectomy.

The operation of colectomy shown in the film[1] is performed for the sake of safety. The one death in this series was that of a girl, aged twenty-two years. I had previously performed colectomy in two cases and carried out a successful anastomosis in one. In the other the rectal stump had been closed, a permanent ileostomy being left.

In the fatal case, the colon was removed and the stump of ileum telescoped into the stump of rectum over a rubber tube. Although it was carefully sutured with interrupted thread, it unfortunately happened that at about the forty-eighth hour the tube was pulled out during some nursing manœuvre. Obstruction occurred and the ileostomy was reconstituted. Despite chemotherapy and all the attentions of biochemical and medical specialists, the patient quietly deteriorated and died.

The experience was salutary. The rectum is stiff and inflexible; even with all the care the surgeon may take, other people may spoil the result. For the remaining five patients already subjected to colectomy, the manner of anastomosis is as shown in the film—that is, a Paul-Mikulicz exterior union.

The incision is the same as for ileostomy. Thread purse-string sutures are inserted in the two ileostomy openings, and the wound is opened and enlarged. The mesentery of the distal ileac portion is divided and ligated with thread. The peritoneum of the right paracolic and paracaecal area is split and the caecum and ascending colon are turned over toward the mid-line. The vessels in the medial sheaf of peritoneum are clamped and ligated. The hepatic flexure is stretched and the peritoneal attachment is divided. Care must be taken to avoid damage to the duodenum at this stage. The omentum as a rule is removed with the transverse colon; it may or may not be possible to preserve some of it. The gastro-colic ligament and mesocolon are divided between hæmostats and each portion is ligated with thread. The splenic flexure does not appear at once, but is rendered more mobile if the peritoneum is split in the left paracolic gutter, the descending colon is turned medially and its medial attachments are divided; then with the transverse and descending colon together pulled down, the splenic flexure attachments are easily clamped and divided. It now remains to clamp and tie off the sigmoid colon. The colon is removed close to its peritoneal attachments, since there is no need to remove the enlarged inflamed lymph glands. As one proceeds, it is wise to wrap the colon in packs and tie it securely, since perforation and leakage may occur in handling the friable ulcerated bowel. Finally, a stab incision is made low in the left or right iliac fossa, as suits the comfortable lie of the proximal ileal stoma and the stump of sigmoid colon and the rectum. A number 14 rubber catheter is placed in the ileum as for ileostomy. The ileal end is drawn through to lie proximally, and the colon is then divided; the distal end is carbolized, closed with a circular thread and carefully drawn through the stab incision so that it lies in the distal corner of the stab wound. The peritoneum is sutured to the tag of mesentery and to a loose piece of *appendix epiploica* of the sigmoid. It is unwise to put any sutures in the bowel itself.

Gauze is packed around the two bowel stumps which lie side by side, and a forceps is attached to the thread on the stump of sigmoid. This prevents withdrawal of the colon stump into the abdomen. The abdominal wound is closed without drainage. No attempt is made to suture the peritoneum on the posterior abdominal wall. The tube is removed from the ileum in forty-eight hours and the bag is then replaced. Glucose solution and perhaps a litre of blood are given intravenously and normal diet is resumed as soon as possible, roughage being avoided. The spur between the ileal and colonic stumps is crushed in ten days, and shortly afterwards the small opening in the bowel is closed. This last operation depends on the condition of the rectum. If ulceration persists, the anastomosis may be delayed until conditions in the rectum clear up.

[1] Dr. Coates showed a cinematographic film to illustrate his paper.

Comments.

A male patient, aged twenty-two years, had a large carcinoma of the transverse colon. He is now very well, and able to undertake normal work and sport.[2]

A male patient, aged sixteen years, had multiple polypi in the colon. His rectum will require regular examination and possibly excision later.

After the operation of colectomy the ileal discharge may become copious, and thus the blood chemistry requires watching. One patient became very ill from loss of salt. His blood chloride content dropped to 400 milligrammes *per centum*. A careful check must be kept on the electrolyte balance and the serum protein content.

One patient had an attack of small bowel obstruction in the interval between ileostomy and colectomy. This is not surprising. Plastic peritonitis observed in these cases is due to the long-standing and extensive infection of the colon.

All the patient in this series showed remarkable improvement after ileostomy was performed.

One, Mrs. B., who wishes to avoid colectomy, has a certain amount of skin irritation from the discharge. Her rectum has returned almost to normal, but recent X-ray examination of the colon reveals the typical drain-pipe and ulceration in the sigmoid colon. Colectomy and anastomosis were advised.

Most of the patients have such a diseased colon that excision is the only safe procedure.[3]

Mrs. C. had an ileostomy for two years and regained her weight; but then hæmorrhage recommenced and became profuse, and colectomy had to be performed urgently. The rectum is not yet fit for complete closure of the stoma.

Two patients referred for operation were returned to their physicians, as it was thought that they should be submitted to intensive medical and perhaps psychosomatic treatment. They may come back for surgery, but I consider that all forms of therapy should be tried before surgery is invoked. On the other hand, it is useless expecting the surgeon to obtain good results if only the moribund, the exsanguinated and derelicts are sent to him. This work calls for liaison between physician and surgeon. There is a similarity to goitre—a psychological element, a type of patient, a progressive irreversible physical change.

Earlier ileostomy may permit healing in some cases. The almost universal abhorrence of surgeons for this procedure is not justified.

Time and patience and some skill, but above all the collaboration of physicians and surgeons in the medical management of the patients, are well repaid by the gratitude of the patient, whose life is changed from one of abject misery to comfort and health.

References.

(1) A. E. Coates: "Surgery in Japanese Prison Camps", *The Australian and New Zealand Journal of Surgery*, Volume XV, 1945 1946, page 147.
(2) R. B. Cattell: *Gastroenterology*, Volume X, 1948, page 65.
(3) R. B. Cattell: *loco citato*, page 63.

ULCERATIVE COLITIS: THE ILEOSTOMY LIFE.[1]

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ACCUMULATED experience has led to the emergence of ileostomy and colectomy as most important surgical procedures in non-specific ulcerative colitis.

The precarious condition of patients referred for surgical treatment usually contraindicates extensive initial operations. The ileostomy artificial anus is therefore employed both as a form of treatment *per se* and as a preliminary measure to colectomy.

[1] Read at a combined meeting of the Section of Medicine and the Section of Surgery, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

In favourable cases at least, and especially when diseased segments of bowel can be removed, it may be possible at a later date to restore alimentary continuity without relapse and deterioration. When there is heavy involvement of the rectum by the disease process, and especially when extensive perirectal suppuration and fistulæ are present, such an artificial anus should not be made without frank admission that subsequent closure might involve grave risk of relapse.

Some sufferers will not regain health without complete excision of both colon and rectum. Further, in a disease which presents such chronic and intractable forms, it may be wise to allow considerable periods to elapse between stages of operative treatment, so that ileal drainage is in consequence prolonged. Good management of an ileostomy is therefore of great importance.

There is a natural prejudice, shared by doctors and patients alike, against an artificial anus of any type, and some doctors have shrunk from surgical treatment owing to misconceptions as to the magnitude of the difficulties, dangers, and discomforts of ileostomy drainage.

Objections to Ileostomy.

The procedure has been variously stated to be objectionable on the grounds of continuous soiling with fluid fæces, disturbances of metabolism and nutrition, digestion of the skin, frequency of formation of abscesses and fistulæ, and the incidence of strictures of the colon due to cicatrization following operation.

It should, however, be noted that the ileal discharge thickens after operation, and that it is not offensive as in colostomy drainage.

Careful observation by Whittaker and Bargen[1] revealed no lasting disturbance of mineral metabolism following ileostomy, and this has been borne out by ample clinical evidence. Even under the severe conditions prevailing in Japanese prison camps in the recent war it was shown convincingly that sufferers from grave colon infections treated with an ileostomy could derive nutriment from a meagre ration as well as their fellows (Coates,[1] Dunlop[3]).

Some excoriation and redness of the skin are likely to occur if the skin is permitted to be continually moist with discharge, but the contents of healthy ileum will not cause digestion of tissues or failure of wound healing.

The formation of abscesses and fistulæ relates to errors of operative technique, and particularly to the exteriorization of diseased ileum.

When severe and long standing damage has been suffered by the colon and extensive loss of mucosa has taken place, cicatrization is inevitable, and stricture formation may result. This baleful effect must be attributed to the severity of the disease process and not to a measure clearly shown to aid the healing process.

The Place of Ileostomy in the Treatment of Non-Specific Ulcerative Colitis.

Though many of the objections to an ileostomy artificial anus are not well grounded, it is a serious inconvenience. It has by no means been shown that a temporary ileostomy will cure the disease at any stage, and an apparently complete remission may be followed by relapse.

It would seem wise counsel to recommend ileostomy only in cases in which the discomfort and dangers will be much less than those of the disease.

As illustrations of varying opinions and practice, Kiefer[4] of the Lahey Clinic deemed medical results unsatisfactory in 43% of cases, and Cattell[5] treated 30% of 400 affected persons by surgical methods. In the Mayo Clinic Bargen[6] records surgical treatment in 5·5% of cases.

It is submitted that an ileostomy should be performed as an initial step in surgical treatment under the following circumstances: (*a*) When failure of medical treatment associated with grave deterioration has occurred in fulminating, acute or chronic cases. (*b*) When serious complications arise. Bargen[6] states that serious complications are encountered in 15% of cases: (*a*) perforation, whether threatened or actually present; (*b*) repeated hæmorrhages leading to severe anæmia; (*c*)

fistulæ and sinuses associated with colon or rectum; (*d*) stenosis and obstruction associated with extensive colitis; (*e*) polyposis (pseudopolyposis) of the colon or rectum; (*f*) carcinoma of the large bowel.

The last-mentioned condition is not infrequent in long established ulcerative colitis with pseudopolypoid changes. Bargen[7] has recently collected records of 54 such cases. Duffy[8] noted the occurrence of carcinoma in three of 82 patients admitted to the wards of the Alfred Hospital over ten years. My personal experience includes two such cases in patients aged twenty-four and thirty-nine years.

Cases Illustrating Indications for Surgical Treatment.

Case I: *Perforation.*—D.N., a married woman, aged twenty-six years, had suffered from frequent passage of blood and mucus and had deteriorated steadily for fourteen weeks. Inadvisedly a very restricted sigmoidoscopic examination was accompanied by introduction of a small amount of air. Perforation occurred above the level of examination in a sigmoid colon subsequently shown to have in places the consistency of moist blotting paper. Operation was refused for fourteen hours, at which time her pulse rate was 180 per minute, and she appeared almost moribund.

FIGURE I.

Adhesive type of ileostomy bag, used with skin cement. It consists of a rubber bag with a flange, metal facing, and belt. Note that it empties from the lower end.

On February 2, 1947, through a left paramedian incision large quantities of fæcal fluid admixed with sulphaguanidine were sucked out. The perforation was easily seen and closed with interrupted sutures. The pelvis was drained and a double-barrelled ileostomy established through the right rectus muscle. Recovery was for a time followed by good health and no rectal motions. Serious relapse then rendered a single-stage colectomy necessary, on October 4, 1947. The ileostomy was maintained and the distal part of the colon exteriorized. Six weeks later a small bowel obstruction due to adhesions was relieved by operation.

The patient is now quite active and very cheerful, but a little blood and mucus are still discharged from the recto-sigmoid and disconnexion of the ileostomy is contra-indicated.

Case II: *Repeated Hæmorrhages and Severe Anæmia.*—S.D., a single woman, aged thirty-two years, suffered from ulcerative colitis associated with polyarthritis for five years. Recently severe bleeding had taken place, so that after three months in hospital and repeated blood transfusions the hæmoglobin level was 28%. After suitable preparation a double-barrelled right rectal ileostomy was performed on July 31, 1946.

Bleeding ceased, the disease became quiescent and the patient rapidly regained weight and strength. There have since been no rectal motions apart from those due to occasional cleansing washes. She feels too well to desire colectomy, but closure of the ileostomy is not considered advisable. There is some X-ray evidence of residual ulceration in the distal part of the ileum despite clinical quiescence.

Case III: *Ano-Rectal Suppuration and Fistulæ.*—D.W., a male, aged fifty-four years, had over twelve months undergone repeated futile surgical onslaughts upon gross ano-rectal suppuration and fistulæ. The diagnosis of ulcerative colitis of non-specific type was followed by construction of a double-barrelled ileostomy on June 7, 1946. Toxic symptoms abated slowly and marked relief appeared to follow institution of irrigations with sulphaguanidine suspensions.

Excision of the colon and rectum was advised, but as the fistulæ have dried up and become painless the patient is content with his present state. He has not lost a day of working time for over twelve months and "eats and drinks anything".

Case IV: *Carcinoma.*—A married woman of thirty-nine years had suffered from recurring ulcerative colitis for sixteen years. When first examined she had been in a hospital bed for seven months and had derived no relief at all from appendicostomy. She weighed three stone twelve pounds and was a picture of despair. A double-barrelled ileostomy under local anæsthesia on October 25, 1946, gave some relief. Wound healing and ileostomy function were satisfactory, but death occurred three weeks later from bronchopneumonia. Pseudopolyposis was present and there were two areas of carcinomatous change.

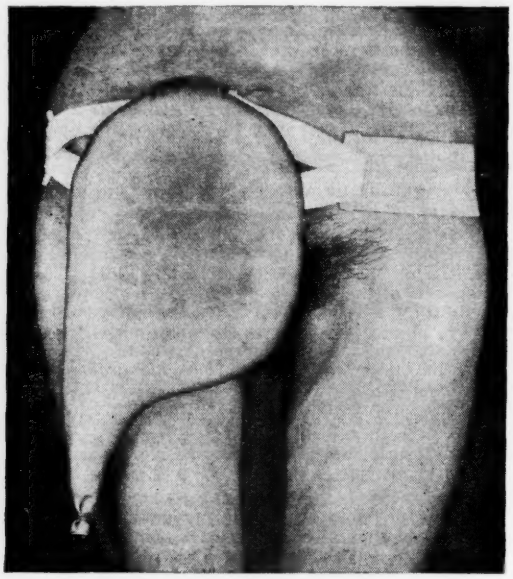

FIGURE II.

Patient wearing belt and adherent bag.

Preparation for Ileostomy.

In the absence of grave emergency some time should be spent in preparation for surgery. Dehydration, chloride depletion, anæmia and hypoproteinæmia usually require intravenous methods for correction. Patients able to eat should be encouraged to take a high calorie diet rich in protein and of low residue, with added vitamins. A non-residue diet is desirable for twenty-four hours prior to operation. Phthalyl sulphathiazole, penicillin and other chemotherapeutic agents are of great value.

Types of Ileostomy.

1. *Simple Loop Ileostomy.*—In the original method described by Brown[9] in 1913, a loop of ileum is brought out of the incision in the fashion commonly used in

colostomy technique. It is unsatisfactory as regards diversion of the fæcal current unless the loop is subsequently divided, and may be even dangerous unless a tube is passed through the abdominal wall into the afferent limb of ileum. With œdema following operation the loop becomes rather cumbrous and hinders early application of a suitable bag.

2. *Single-Barrel Ileostomy.*—Single-barrel ileostomy has been recommended by Rankin[110] and extensively employed by Dennis.[111] The ileum is divided and the efferent limb closed and returned to the abdomen. Easy lavage of the colon is thus precluded, and distal colon obstruction may lead to perforation or leakage of the suture line.

3. *Double-Barrel Ileostomy.*—The divided ileum is brought through the abdominal wall with afferent and efferent limbs in apposition. It is the most universally applicable method and has been specially recommended (Cattell,[112] Maingot[113]) for patients in poor condition. As a variant of this technique, in staged colectomy, ileum is brought out with distal rectosigmoid preliminary to crushing and restoration of continuity (Devine[114]).

FIGURE III.
The Travellor bag. Expendible rubber sheaths on metal facing, satin bag, and belt.

4. *Divided Loop Ileostomy.*—Divided loop ileostomy is of special value in elective surgery when subsequent colectomy is planned (Cattell,[112] Maingot,[113] Cave and Nickel[115]). The afferent limb is usually brought out through the wound, and the efferent limb through a separate site planned to make subsequent colectomy easy. Careful suture of the ileomesentery across the intervening peritoneum lessens the tendency to prolapse of ileum. However, the operation is more prolonged and there is greater danger of peritoneal contamination. Unless subsequent colectomy is carried out a separate mucous fistula is an added trial.

Choice of Method.

For these sick patients the initial operative procedure should be simple and of as short duration as possible. I prefer a double-barrel ileostomy through the right lower rectus. This will usually ensure sufficient improvement for colectomy to be performed in a single stage; then the proximal limb of ileum may be transferred to a similar site on the left side of the abdomen where it is brought out with the distal stump of colon.

If restoration of alimentary continuity is certain never to be advisable, and colectomy is planned in the near future, the divided loop ileostomy has merit.

Points of Technique.

The Incision.—Long exploratory incisions should not be used unless there is some special indication, and the temptation to examine the friable colon should be resisted. The site of the incision is dictated mainly by comfort in wearing an ileostomy bag which necessitates a stoma below the belt line and away from the anterior superior iliac spine, the umbilicus and the inguinal fold. The stoma should be placed six centimetres below the umbilicus and three centimetres to the right of the mid-line (Cattell[112]). A vertical right rectus incision five centimetres in length centred on this point gives adequate exposure. If an exploratory incision is necessary, the left paramedian route may be employed and the ileostomy performed through a small right rectus-splitting incision.

The Ideal Site.—The site is of great importance in the avoidance of subsequent wound suppuration and fistula formation. The terminal part of the ileum is frequently involved in the disease process. The site selected should be at least 12 to 18 inches from the ileo-caecal junction. As a result of disastrous personal experience, Crandon, Kinney and Walker[116] advocate a distance of 90 centimetres.

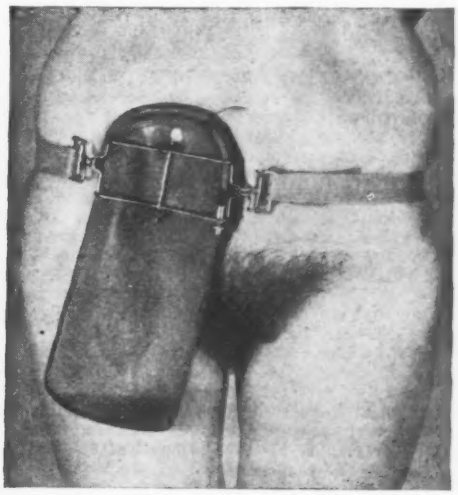

FIGURE IV.
Patient wearing Davol bag.

Fixation.—The selected loop is withdrawn, and first the mesentery and then the bowel is divided. Soft flexible tubes of good internal bore should be fixed in both limbs a sufficient distance to pass through the abdominal wall. If such tubes are introduced in water-tight fashion with silk purse-string sutures they may be left undisturbed for a week. The two limbs with their contained tubes should be so placed in the wound as to allow a projection of bowel of about one inch, and the functioning stoma should be placed below the other opening.

With carefully planned incisions it is necessary to suture only ileal mesentery to the wound incision. An interstitial mattress stitch through all layers of the abdominal wall and an avascular area of mesentery is usually adequate.

Abscesses and fistulæ about the stoma usually arise from needle punctures in diseased ileum, and both factors may be avoided. A new ileostomy at a higher level and subsequently excision of the distal part of the ileum and colon were successful in one case.

Post-Operative Care.

The afferent tube should be irrigated with saline solution in the operating theatre, to ensure that there is no "locking", and then connected to a bottle. The bowel is covered with "Vaseline" gauze, and the wound is not disturbed for seven to nine days, when the tubes loosen. The skin is then healed sufficiently for a bag to be applied.

Morphine is of value in the early stages.

Fluids by mouth are usually permitted on the day of operation, and next day a soft low-residue diet with ample

vitamins is begun. This promotes ileal discharge. Vigilance must be exercised for hiccup, abdominal pain, distension and vomiting, which may accompany cessation of drainage.

Methods of temporary clamp obstruction, such as that advocated by Garlock,[17] are dangerous. Obstruction is most often due to roughage in the diet, and during the first few weeks when the exteriorized bowel is œdematous this should be avoided. Treatment may involve finger dilatation, irrigation of the obstructed loop or the Wangensteen type of continuous suction to the ileum.

As the discharge may amount at this stage to 50 or 60 fluid ounces daily, the attention to fluid balance must be thorough.

Some skin excoriation is usual at first, but later the skin becomes more inured to irritation; tannic acid jelly is the most popular application.

When signs of active colitis and toxicity persist, colon lavage may help. Occasional good results have been noted with sulphaguanidine suspended in saline, and with phthalyl sulphathiazole. In some cases only irritation attends lavage.

Late Management.

Stools.

The ileostomy stool following compensatory changes is non-offensive and alkaline in reaction; the average water content is 91% and the average weight 433 grammes, compared with the normal 170 grammes; an average time of three and a half hours is taken by "marked" foods to reach the stoma.

The stool thickens in a few weeks and is usually semi-formed by three months. When the largest meal is in the evenings, discharge is most profuse in the early part of the night and there is relatively little in the mornings. Bags are usually emptied three to six times daily. Patients who cease to have rectal motions usually prefer to wash the colon through to remove debris at intervals of one or two weeks.

Ileostomy Bags.

The essential features of a suitable bag embody accurate fit, avoidance of skin soiling and ease in emptying. These have been best met by the Koenig-Rutzen type of bag, which exactly fits the opening and has a flange stuck to the skin by a suitable cement (a "Latex" solution is suitable). The bag can be emptied without removal, as with the similar bag illustrated (Figures I and II).

With the Travellor bag the discharge is collected in expendible, detachable, thin rubber sheaths which may be discarded without removal of the belt (Figure III).

The Davol pattern bag with an inflatable rubber rim has proved fairly secure and permits active economic and social existence, though removal at each time of emptying is a nuisance (Figure IV).

A similar bag with sponge rubber incorporated into the rim appears to be equally satisfactory and more durable.

With all types of bags prolapse of the ileum may occasionally arise, especially if the patient continues strenuous pursuits.

Diet.

A restriction of roughage is essential for a few weeks after operation. The patient soon becomes aware of articles which cause unfavourable reaction. After a few months most patients find no restriction necessary.

Occupational Factors.

The relief from distressing invalidism experienced by most of these patients inculcates a cheerful and vigorous attitude of mind, so that many find it possible to return to their normal occupation and to live full lives.

Case V.—L.W., a male, aged twenty-eight years, after five years of fluctuating severity of colitis was utterly exhausted and close to death. There were gross perineal suppuration and fistulæ, and he had little control over the constant discharge from the rectum. Ileostomy on February 15, 1946, was followed by speedy recovery, and it was later possible to cure the fistulæ by operation. For over two years he has worked actively as an engineer and enjoys active social life. He feels that his health would not be better with colectomy and is not willing to risk restoration of alimentary continuity. The disease has remained quiescent and there are no rectal motions.

Mortality Associated with Ileostomy.

Mortality figures are determined largely by the condition of patients prior to surgery, and the range is therefore wide. Examples are those of Strauss:[18] four deaths in 104 operations (he is an advocate of early surgery); Bargen *et alii*: 18·9% within two weeks; Cave and Thomson:[19] 23%; Garlock:[17] 13·3%; Cattell:[6] 14·5%.

Records available of cases of treatment by various types of ileostomy at the Royal Melbourne Hospital reveal three post-operative deaths in 26 cases.

In a small personal series of 16 cases of ileostomy for severe colitis and complications two deaths occurred. In one of these two fatal cases operation was carried out for grave peritonitis following multiple perforations, and the other was a desperate case complicated by carcinoma (Case IV).

Restoration of Alimentary Continuity after Ileostomy.

Some surgeons have advocated early treatment by ileostomy before changes in the large bowel become irreversible, so that subsequent disconnexion of the ileostomy may be practicable.

Cattell's[20] criteria for closure are: complete remission for at least twelve months, no ulceration present on sigmoidoscopic examination, and X-ray evidence that the colon has a satisfactory lumen and some flexibility as shown by haustral markings *et cetera*. However, relapse apparently occurs frequently, even under these favourable conditions, and closure of ileostomy has only occasional application.

For the type of patient at present seeking surgical aid, colectomy is usually advisable, and some require excision of the rectum as well. When, after colectomy, the rectum shows apparent healing, ileo-rectal or ileo-sigmoid anastomosis may restore continuity.

The period of "defunctioning" of the rectum should be prolonged, and restoration of continuity by the crushing clamp method is much safer than by suture.

Conclusion.

It has been truly stated that ileostomy may be the price some patients pay for life. It is equally true that ileostomy may be more tolerable than continued severe colitis or proctitis.

An ileostomy artificial anus can be made with small risk in patients whose condition is not desperate prior to operation, and with modern management a cheerful and useful economic and social existence is possible.

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PRESENT CONCEPTS IN ULCERATIVE COLITIS.[1]

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MANY diseases produce ulcerative lesions of the large bowel of which bacillary dysentery, tuberculosis, *lymphogranuloma venereum*, amœbiasis and uræmia are well known examples. In many cases, however, no ætiological factor can be determined, and the disease has been variously termed idiopathic ulcerative colitis, non-specific ulcerative colitis or thrombo-ulcerative colitis. This malady may be defined as a disease or group of diseases of unknown ætiology, characterized clinically by diarrhœa (bloody at some stage), cramping abdominal pain, fever, anorexia, anæmia, asthenia and weight loss. Remissions and exacerbations are frequent and unpredictable, and during the active phase sigmoidoscopic examination usually reveals an ulcerated mucosa. Sir William Wilks is said to have described this disease in 1875.

Ætiology.

Infection.

The clinical syndrome, especially in the acute phase, is strongly suggestive of an intense infection, and it is undoubtedly for this reason that most investigators have searched for a specific organism.

It is not unlikely that a number of organisms may produce the same clinical picture, and so at this stage it may be advisable to regard non-specific ulcerative colitis as a group of diseases perhaps of differing ætiology. In 1924 Bargen[1] produced evidence suggesting that a specific diplococcus or diplostreptococcus was the responsible organism; but most workers in this field now consider this organism to be one of a variety of streptococci frequently found in stool examinations in this disease and ascribe to it the role of a secondary invader. However, there are some patients presenting the clinical picture of ulcerative colitis from whom a streptococcus is isolated in pure culture, and whose response to sulphonamides and penicillin is most gratifying. Unfortunately such an occurrence is not the common experience, and this particular group of cases should be classified with the "specific" group as streptococcal ulcerative colitis. The organism is not, as a rule, Bargen's diplococcus.

Dragstedt *et alii*[2] described the *Bacterium necrophorum* as a possible causative organism; but it would seem again that this organism is only a secondary invader. It is probable that it plays a part in bringing about chronicity, but as far as can be determined it is not the primary cause of the disease.

Hurst[3] in England and Felsen[4] in America have regarded chronic ulcerative colitis as a chronic form of bacillary dysentery. Undoubtedly some cases of bacillary dysentery do progress to a syndrome which is indistinguishable from chronic ulcerative colitis; but the consensus of opinion is against such an ætiology. One might have anticipated a marked increase in the incidence of this after World War I, and even after World War II, despite efficient modern treatment if bacillary dysentery infection was the causal agent. The increase has not been remarkable, and treatment based on such an ætiology has produced significant improvement in a minority of patients.

Virus infection has been suggested frequently, but little experimental or clinical investigation has been carried out to determine this possibility.

Thus at present there is a lack of knowledge of any primary infective ætiological factor; but once the mucosa is broken a large variety of organisms contributes to the spread of the disease and the production of the clinical syndrome.

Allergy.

The number of patients who respond to allergic management increases with the enthusiasm of the investigator; but allergy may be of some importance as a cause of ulcerative colitis. There is some evidence to indicate that an atopic reagin may be located or fixed in the colonic mucosa, so that the specific allergen acting locally can produce an inflammatory reaction.

Dietary and Vitamin Deficiency States.

Undoubtedly deficiency states predispose the bowel to bacterial invasion, as in pellagra; but there is no evidence that such states are primary ætiological factors in non-specific ulcerative colitis. Owing to loss of blood, protein and vitamins, deficiency syndromes are inevitable in the untreated disease.

Neurogenic Factors.

It seems that emotional factors play a part in ulcerative colitis, particularly in relation to relapses and exacerbations of symptoms (Ginsberg and Ivy[5]). Such psychogenic factors as constant apprehension, prolonged tension, infantile reactions to fear due to financial or occupational worry, infantile attachment to parent or relative, fear of pregnancy, domestic or love difficulties and immature sexual conflicts occur more frequently in these patients than in the general population. Feelings of resentment, anxiety and guilt are common; but these also occur in patients suffering from mucous colitis and peptic ulcer. Furthermore, mucous colitis does not progress to ulcerative colitis. Thus it would seem that some additional factor is necessary to produce ulceration.

It is probable that the colonic nuclei of the hypothalamus are affected by these emotional disturbances, and they in turn through the parasympathetic fibres produce blushing, congestion and blanching of the mucosa and excessive secretion of mucus. Similarly the motility of the colon is affected, with the production of a general increase in motility, localized or general hypertonus and incoordination between segments. Lium[6] has demonstrated acute ulceration of the colonic mucosa as the result of strong contraction of colonic musculature.

Lysozyme.

Recently Karl Meyer, Alfred Gellhorn *et alii*[7] have shown that the mucolytic enzyme lysozyme is greatly increased in chronic ulcerative colitis up to seventy-five times the normal amount, whilst remaining normal in other colonic diseases. This enzyme removes the protective mucus from the colonic mucosa, permitting necrotizing action on the mucosa by the indigenous bacterial flora. Local overproduction of lysozyme may be due to abnormal autonomic influences. Interestingly enough, "Nisulfazole", one of the newer sulphonamides recently used in the treatment of this disease, inhibits this enzyme.

Conclusion.

At present it would seem that no case has been made out for any one primary ætiological factor. Undoubtedly

[1] Read at a combined meeting of the Section of Medicine and the Section of Surgery, at the Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

infection plays a large part in the clinical manifestations of the disease, but it probably follows on some other factor which alters mucosal resistance. Likewise local allergy may play a part and should be considered in treatment. Emotional disturbances are undoubtedly concerned in exacerbations and relapses, and if they can be shown to be the causal factor in production of excess lysozyme, then perhaps the disease may be regarded as primarily neurogenic.

Clinical Manifestations.

The disease has not altered through the years, but certain manifestations have received more consideration recently and are worthy of comment.

Segmental, Regional and Right-Sided Colitis.

Crohn called attention to segmental, regional and right-sided colitis in 1925; but it is only during the last five or six years that much interest has been shown in its recognition. Bochus[8] estimates the incidence as 5% to 15%. Crohn[9] states that in this subgroup the pathological process begins and is commonly limited to a segment or segments of the proximal part of the colon. The life history of the disease is characterized by a progressive march to the left, until by skip lesion or by continuity the whole colon from caecum to sigmoid may become interruptedly or continuously involved. The local signs and symptoms, such as bloody diarrhœa and straining, are less severe, but the constitutional symptoms, such as fever, joint pains and anorexia, are more apparent. The condition lends itself to surgical short-circuiting procedures. Sigmoidoscopic examination may reveal a normal mucosa, as was the case in the patient whose X-ray findings after a barium enema are shown in Figure I. In this particular case, anorexia, cramping abdominal pain, anæmia and constipation were the principal clinical features. Occasionally the terminal portion of the ileum is involved and in such cases the condition is usually grave.

The Extent and Duration of the Disease.

It has been commonly believed that the disease is inevitably progressive from the rectum to the caecum; but Ricketts, Kirsner and Palmer[10] adduce evidence to suggest that in the majority of cases the disease attacks the colon either partially or completely during the initial episode, and usually remains relatively stationary in distribution thereafter.

Radiological and Clinical Correlation.

The extent of radiological involvement is not correlated directly with the type of onset, the duration of symptoms or the clinical severity of the disease. Radiologically the colon may appear normal in a patient manifesting clinical evidence of the disease (Figure II). Occasionally the colon appears to be extensively involved radiographically, but clinical signs are minimal (Figure III). Sigmoidoscopy and stool examination are essential in order to appreciate the pathological state of the bowel.

Hepatic Disease in Ulcerative Colitis.

It is thought by some that liver dysfunction and cirrhosis may occur as a complication of colitis due to protein and vitamin loss. Undoubtedly severe liver damage does occur in cases of extensive ulceration; but the incidence of liver disease is probably no higher than in some other diseases which cause chronic protein deficiency. However, recently at the Royal Prince Alfred Hospital two young women, long sufferers from the disease, experienced severe intestinal hæmorrhage. As they recovered the liver became palpable and they developed ascites. Liver function tests showed considerable impairment of function. Gradually as nutrition improved the evidence of hepatic dysfunction subsided. These two patients draw attention to a systemic effect of this disease which is apt to be neglected by clinicians.

Malignant Degeneration.

Recently Cattell and Boehme[11] have again called attention to the importance of malignant degeneration as a complication of chronic ulcerative colitis. At the Mayo Clinic the incidence was 3·2% in 871 cases and at the Lahey Clinic 2% in 450 cases. Two such cases have been discovered at the Royal Prince Alfred Hospital during the last two years, one being found at autopsy on a young man who had been the victim of ulcerative colitis for many years.

Cattell emphasizes the high incidence of this complication in children, and also points out that it may occur in patients who have been in a state of remission for several years and also in a colon which has been excluded by ileostomy. Undoubtedly malignant degeneration is much more frequent in the bowel of a person who has suffered from ulcerative colitis, and it behoves the clinician to be aware of this fact.

Treatment.

The main objectives in treatment—namely, control of symptoms, arrest of the inflammatory lesion and prevention of invalidism—have not altered since the turn of the century. Just as a specific ætiological factor has defied investigators, so a specific therapeutic measure has eluded the clinician. Thus reliance must be placed on certain palliative and supportive measures, such as the control of diarrhœa by opium, papaverine, belladonna, bismuth and kaolin, the correction of malnutrition, blood loss and protein depletion, the eradication of other foci of infection, and attention to psychotherapeutic aspects. In addition to these general measures varying methods are in use in an endeavour to treat the inflammatory process in the colon. At present a chemotherapeutic and antibiotic approach both locally and parenterally seems most successful.

Whichever therapeutic combinations are used, all will be enhanced if the colon can be put at rest. Ileostomy performs this for the clinician; but it is very permanent. Two methods have been used recently at the Royal Prince Alfred Hospital in an endeavour to place the colon at physiological rest, at least for a short period, in order to assist other therapeutic measures. They are total intravenous alimentation and medical ileostomy.

Total Intravenous Alimentation.

Four patients have been treated by total intravenous alimentation, and the period of intravenous feeding has been from eight to thirteen days. Various casein digests have been used, and as a rule between 50 and 75 grammes of amino-acids have been given daily. In addition glucose, saline solution and blood transfusions have been employed to make the daily intake approximately three litres of fluid. Vitamins and liver extract have been given parenterally and sips of water only were allowed by mouth.

All four patients were desperately ill, and in one profuse hæmorrhage was occurring. The number of bowel actions varied from 16 to 24 daily for some days prior to the introduction of this therapy. Within forty-eight hours three of the four patients had ceased to have any bowel actions. The remaining patient continued to have one or two motions a day throughout his period of parenteral alimentation. Fever subsided in two cases, and one patient remained in remission after cessation of therapy. The other three patients relapsed when oral feeding was recommenced, although their condition was much improved and the number of motions much less. Interestingly enough, sigmoidoscopic examination revealed no great improvement—thus contrasting with their clinical state.

Several interesting clinical factors were noted during this type of feeding. There was no sensation of thirst, and colicky abdominal pains disappeared. If anything additional to sips of water was taken by mouth, bowel actions would occur.

Medical Ileostomy.

Medical ileostomy was introduced by Machella and Grier Miller of Philadelphia several years ago, and their results have been reported recently.[12]

The aim is to pass a double-lumen Miller-Abbott tube to the terminal portion of the ileum, and then to apply continuous suction. By these means the contents of the

terminal portion of the ileum are aspirated, and small bowel contents are prevented from entering the large bowel. Fluids, preferably of high protein, high carbohydrate and high vitamin content, are given freely by mouth. The aim is by these means to supply adequate nutrition and yet at the same time place the large bowel at rest. This method has been attempted on three occasions. Frequent fluoroscopic examination is necessary in order to determine the location of the tip of the tube. This is sometimes distressing for a seriously ill patient. It also demands considerable skill and constant attention to maintain the tube in position and functioning. There is a constant tendency for the tube to pass into the colon; but if it can be maintained in position the result is most gratifying. The number of motions diminishes considerably—in fact, in the three cases in which it was tried, bowel actions ceased within twelve hours. After several days one or two small motions might be passed, but as a rule any increase in frequency above this number was an indication that the tube had passed into the large bowel. In one case the tube was maintained in position without much difficulty for fifteen days. The result was most satisfactory, and a remission was induced. However, in the other two cases the results were not so happy. One patient became rapidly intolerant of the tube, and after four days it was removed; but in that time the number of motions had dropped from sixteen per day to nil. After removal of the tube fluid feedings were continued, and although frequency of bowel actions returned the patient's condition was improved. The third patient was most cooperative and on two separate occasions at some months' interval submitted to this therapy. Unfortunately it was found impossible to maintain the tube in position. After a varying period in the terminal part of the ileum it always passed into the large bowel, with the occurrence of much abdominal pain and diarrhœa. Finally in her case the method had to be abandoned.

Comment.

A limited experience with these two methods indicates that under many circumstances they add considerably to the physician's armamentarium. For the acutely ill patient who appears to be rapidly deteriorating either method may be life-saving. Unfortunately only a short respite is obtained, but it is often sufficient to change the course of the disease. Whilst medical ileostomy is being employed it is possible to irrigate the large bowel from above through the Miller-Abbott tube if so desired. With complete parenteral alimentation any local treatment of the large bowel is limited to rectal instillations.

Summary.

Certain modern concepts in regard to the ætiology of ulcerative colitis have been reviewed, some aspects of the clinical manifestations of the disease have been stressed, and two medical methods aimed at producing physiological rest in the colon have been mentioned.

It may be concluded that, although sound progress has been made in recent years in attempting to understand ulcerative colitis, it still defies medical science. To quote Sara M. Jordan: "Unhappy are we who know our limitations".

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ULCERATIVE COLITIS: CLINICAL FEATURES, DIAGNOSIS AND TREATMENT.[1]

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ULCERATIVE COLITIS is a distinct entity, characterized by ulceration of the colon of unknown ætiology.

Mode of Onset.

The initial manifestations of the disease are usually diarrhœa of acute onset, followed after a few days by the passage of blood-stained mucus in gradually increasing amount, mild fever, anorexia and malaise; but a fulminating onset may occur. In some instances there is a history of recurrent attacks of diarrhœa lasting for several days or even weeks with periods of relative normality between attacks, whilst in others there is an insidious onset extending over a period of several weeks with the gradual development of uncontrolled diarrhœa and ill-health.

Clinical Features.

The clinical features of ulcerative colitis are readily understood if one considers the pathology and morbid anatomical changes[6] present in the disease. There is gross inflammatory reaction in the mucosa with actual destruction resulting in ulceration, which may extend deeply into the muscularis and actually cause perforation. The surviving mucosa is œdematous and even inflamed. Infiltration of the whole thickness of the gut may be present with thickening, pericolic inflammation, adhesions to neighbouring viscera, the formation of abscesses and fistulæ; and remote complications due to bacteriæmia or toxæmia are common. Attempts at healing result in fibrosis with stenosis and shortening of the bowel and mesentery. Peristalsis is abnormal. Intestinal contents become abnormal, blood, pus and serous exudate being present. Bacterial flora are altered and recognized pathogenic organisms are often present. The personality of the patient is inevitably affected by the nature of the illness, and the physiological activity of the whole of the alimentary tract is upset.

Particular attention is directed to the personality, toxæmia, nutritional changes, intestinal manifestations, local and remote complications.

Personality.

The personality of the patient differs from the average normal in most of the cases and to such a degree that there have been many protagonists of the psychogenic causation of the disease. Immaturity, childishness, emotional instability, dependence, sensitiveness, overconscientiousness, fussiness, anxiety and a fear of failure may be present singly or in combination,[(1)] and examination by a psychiatrist will usually disclose some factor or factors of significance. It is obvious that social, economic or domestic difficulties cannot fail to have a profound

[1] Read at a meeting of the Sections of Medicine and Surgery at the Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

effect on such individuals and aggravation of existent lesions would be inevitable in greater or less degree; but it remains to be proved that psychogenic factors can actually cause ulcerative colitis. Many clinicians of repute have asserted that colon neurosis does not progress to ulcerative colitis;[1][3][5] and while the former is common, the latter disease is relatively infrequent. Furthermore, the clinical history of ulcerative colitis is quite different and distinct, the disease "develops along its own special lines"[1] and is not preceded by the history or features of the various disorders of function which are best described as manifestations of colon neurosis. It is highly probable that in many instances granular procto-colitis has been diagnosed as ulcerative colitis, and I am of the opinion that the former lesion is often psychogenic in origin; and as will be shown later, an early stage of ulcerative colitis is often indistinguishable from it. The personality of any person suffering from a chronic disease of the colon becomes to some extent affected by his disability. Introspection, anxiety, and disturbance of emotion are common results.

Toxæmia.

Toxæmia is always present and is manifest in intermittent pyrexia, sweats, tachycardia, loss of weight, malaise, anorexia, headache and lesions remote from the colon, namely, arthritis, ocular disease, renal lesions, thrombosis, inflammation of serous membranes and splenomegaly. Clubbing of the fingers and toes is often seen and subsides with cessation of toxæmia.

Nutrition.

Emaciation, always present in ulcerative colitis, may be extreme and is attributable not only to decreased caloric intake as a result of poor appetite but also to loss of blood and protein in the stools, disordered digestion and increased katabolism from toxæmia. Too often the caloric value of the food has been wrongly reduced by direction of the attending physician, who unwisely restricts the diet to unpalatable, uninteresting, stodgy meals, low alike in Calories, protein and vitamins, in an attempt to provide, unnecessarily, a diet with no residue.

Severe hypochromic anæmia and a low serum protein content, especially the albumin fraction, are in some measure the result of toxæmia; but they are certainly aggravated by deficient diets, and by persistent loss of blood and of protein from the ulcers. Leucocytosis usually indicates the presence of complications. Alterations in the skin occur as a result of malnutrition combined with toxæmia; dehydration makes it dry and inelastic. Slight cyanosis from defective peripheral circulation is due to toxæmia rather than to nutritional defect.

Avitaminosis is seen as the result of deficient diets. The use of sulphonamides aggravates deficiency of vitamins in the diet because the normal synthesis of vitamins by bacteria in the bowel is prevented owing to suppression of the normal bacterial flora by these drugs. Defective absorption from the intestinal mucosa also augments any deficiency in exogenous vitamins.

Intestinal Manifestations.

Disordered motility, toxæmia, defective absorption (especially where the terminal part of the ileum is involved), abnormal intestinal contents and exudation from the mucosal lesions result in loss of appetite and even anorexia, vague abdominal discomfort, colicky lower abdominal pain, diarrhœa with small liquid offensive stools containing fæcal material mixed with blood, pus, and varying amounts of mucus. Defæcation is often painless, but anal symptoms result from the frequent evacuations and excoriation, hæmorrhoids and even prolapse of mucosa may occur. Sleep is disturbed. Vomiting is uncommon excepting in the fulminating cases, but when present may be wellnigh uncontrollable.

Abdominal tenderness is often very severe and maximum over the course of the colon. The iliac colon may be felt as a firm, tender, cylindrical mass. Rectal examination with the gloved finger is essential, but provides little useful information.

Complications.

Local Complications.

Local complications are the direct result of spreading of the inflammation, of ulceration from the mucosa deeply into the gut or of attempts at repair. The mucosa intervening between the ulcers is greatly swollen and may closely resemble multiple polypi radiologically and at sigmoidoscopic examination. Fibrosis may be present at adjacent areas and the contraction resulting from healing of the ulcers causes narrowing of the lumen which is further augmented by the swollen mucosa and may produce partial obstruction. An apparent stricture may, however, be principally the result of mucosal swelling, and with prolonged remission of the disease the lumen returns to a diameter approaching the normal. Actual strictures do occur in addition to these pseudo-strictures.

Pericolic inflammation, adhesions, fixity of the colon, shortening of the mesentery and shortening of the colon develop in the uncontrolled disease. Abscess formation and fistulæ are the direct result of extension from the gut.

Carcinoma of the colon occurs in association with ulcerative colitis, but whether in any way causative of the latter or resultant therefrom is a matter for conjecture. The frequency of the incidence of carcinoma is higher in subjects of ulcerative colitis than it is in the general population,[2] and great care must be taken to exclude its presence.

Hæmorrhage from the colon is present in some degree in every case, and may actually be the presenting symptom. It has been wrongly attributed to hæmorrhoids. Severe hæmorrhage with a fatal result is more likely to occur at a late stage of the illness. Hæmorrhage *per rectum* has also been seen after colectomy, occurring eight years after the operation from an ulcer in the small portion of rectum left *in situ*. It is in large measure responsible for the severe hypochromic anæmia found in ulcerative colitis. Ileostomy, although it decreases the tendency to bleeding from the colon, does not obviate it, and this is readily understood if the pathology of the lesions is considered. The ileum itself may bleed.

Perforation of the colon and general peritonitis occur rather frequently in fulminating cases and there may be multiple perforation. In such cases ileostomy is part of the emergency treatment.

Remote Complications.

Remote complications apparently result chiefly from toxæmia and are not particularly characteristic of ulcerative colitis. Polyarthritis is common and, as with any debilitating illness, the first evidence may be painless hydrarthrosis. Œdema of the subcutaneous tissues may mask affection of the small joints of the feet, and the relative immobilization of the patient in bed defers detection of the disability. Other serous membranes—for example, pleura and pericardium—may be the site of inflammatory reactions. Endocarditis occurs. Septicæmia may terminate the illness. Renal lesions producing the nephrotic syndrome are due to the toxæmia, as is also the enlargement of the spleen which is so frequently present. The presence of hepatic damage may be responsible to some extent for the low serum albumin content and the altered albumin-globulin ratio of the serum protein.

Thrombophlebitis has occurred even after ileostomy and the latter procedure does not obviate the complications referred to although the local lesions are thereby spared from aggravation. In fact ileostomy, whilst often lifesaving, increases difficulties in nursing and causes irritation of the skin of the abdominal wall which has been followed by extensive and severe dermatitis.

Course.

The course of the disease varies to some extent according to its severity and the mode of onset. In fulminating illness perforation is a frequent cause of death early in the disease. In less severe cases there is great variability in the natural history. Spontaneous remissions and relapses render difficult an assessment of the effects of treatment. Pyrexia may be very slight despite progressive

deterioration in the local and general condition. Complications may become the predominant clinical features. Prolonged remissions extending over many years have simulated cure, but eventual relapse even after ten to twenty years has disclosed the unpredictable course of the condition.

Ileostomy followed by colectomy appears to be the most suitable means of attaining reasonable health in intractable cases or in those in which there is progressive deterioration, lack of response to adequate medical treatment, or severe toxæmia.

Diagnosis.

The diagnosis of ulcerative colitis is attained firstly by exclusion of conditions resembling it, and secondly by recognition of its specific features.

Colon neurosis must be excluded. There is a characteristic history of prolonged emotional instability, morbid introspection, the passage of mucus with or independent of fæcal material, and usually a long history of constipation and the use of purgatives. It must, however, be remembered that a colon neurosis may be superimposed on an organic lesion or result from the latter.

Chronic dysentery and protozoal and helminthic infestations may present difficulty in differentiation, but a competent pathologist can usually provide positive evidence of the cause. Ex-service personnel have increased the rate of possible infection with *Entamœba histolytica* in the general population, and even prior to the last war the infection was endemic in southern parts of Australia, including Victoria. It is therefore always necessary to exclude chronic amœbic dysentery and carriers of the infection whenever an inflammatory lesion of the colon is suspected. Since the introduction of sulphaguanidine and the like, chronic bacillary dysentery is now fortunately very rare. Amœbic and bacillary dysentery are considered in detail in Table I.[3]

Actinomycosis, tuberculosis, *lymphogranuloma venereum*, Crohn's disease, carcinoma, polyposis, hæmorrhoids, diverticulitis, mercurial poisoning, uræmia and thyreotoxicosis must be excluded by a careful history, thorough physical examination, and appropriate investigations.

Granular procto-colitis[4] (hæmorrhagic proctitis) is probably the most difficult condition to differentiate from ulcerative colitis in the early stages. Comparison of the diseases as shown in Table II[4] indicates important diagnostic features; but in an early stage ulcerative colitis may exactly resemble granular proctitis. It is highly probable that many of the medical "cures" of ulcerative colitis have been due to non-recognition of granular proctitis which is often precipitated by emotional stress, may cause alarm because of the amount of blood lost *per rectum* and is often refractory to treatment, especially if it is directed solely to the local condition and attention to psychological factors is inadequate. The only certain method of differentiating the two conditions lies in the fact that granular proctitis which does not progress to frank ulceration is not accompanied by a profound general disturbance and eventually resolves. Recurrences have been seen over a period of observation lasting thirteen and a half years and the history of loss of blood *per rectum* extended over eight and a half years prior to the first examination. This patient, however, has never presented the general clinical picture found in ulcerative colitis.

Tables I and II indicate in fair detail the specific features of ulcerative colitis.

Diagnostic Procedures.

Sigmoidoscopy.

The most important investigation in suspected disease or disorder of the rectum or colon is sigmoidoscopy which should always be performed if digital examination discloses no contraindication to introduction of the instrument. It can and should be carried out in the consulting room or in the ward and is simple, painless and safe. General anæsthesia is contraindicated, but surface anæsthesia can be induced if the anus is tender. Unless extremely ill, the patient should be placed in the knee-chest position; but the Sims position can be used, although it is less satisfactory. The rectum and sigmoid colon should both be examined, but if disease is present in the rectum, as is almost invariably the case, the examination of the sigmoid colon may be deferred if any distress is evident. A blower should not be used because distension of the bowel with air causes pain; furthermore it is unnecessary if the examiner is patient.

The lesions of ulcerative colitis are usually maximum in the rectum and it is very exceptional for the rectum not to be involved. This is also the region which is last to heal during recovery from this and other forms of ulceration.

Clinical History and Examination.

The history must include a social and personal history and inquiry regarding occupation, past and present environment, previous exposure to dysenteric infection or to protozoal or helminthic infestations, and the administration of mercury. A detailed physical examination of the patient is essential.

Examination of Fæces.

The fæces are examined macroscopically and microscopically for pus, mucus and blood. Microscopy involves a search for cells, ova, vegetative amœbæ, cysts and

Table I.[1]

Clinical Feature or Investigation.	Chronic Amœbic Dysentery.	Chronic Bacillary Dysentery.	Chronic Ulcerative Colitis.
Onset	Insidious.	Acute, followed by relapsing course.	Sudden with sweats; sporadic; evidence of infection rare.
Pyrexia	Absent.	Low and irregular.	Usually intermittent.
Course	Very prolonged.	Chronic—five to six years.	Acute or chronic.
Complications	Hepatitis, liver abscess, perforation, hæmorrhage.	Polyarthritis.	Polyarthritis, polyposis, stricture, nephrosis, endocarditis, perirectal abscess, cutaneous ulcers, splenomegaly.
Blood	Usually no anæmia.	Secondary anæmia; may be gross. Positive agglutination.	Severe secondary anæmia.
Leucocytes	Moderately increased usually.	Normal.	Normal; or slightly increased if complications.
Emaciation	Rare.	Extreme.	May be extreme.
Signs	Local tenderness and infiltration of colon.	No tenderness; may be spastic colon.	Tenderness often great; defæcation often painless.
Pathology	Local ulcers in colon.	Chronic serpiginous ulcers or granulation tissue.	Commences in rectum usually; ulceration varies in degree.
Stools	Flakes of blood and mucus; copious; very offensive.	Diarrhœic blood, mucus, undigested food, decomposing, very offensive.	Blood, mucus, pus, undigested food, offensive.
Microscopy	*Entamœba histolytica*—active or cysts, Charcot-Leyden crystals. Red cells, few pus cells and epithelial cells.	Pus cells; occasional red cells; clumps of epithelial cells.	Red cells in clumps; degenerating pus cells and epithelial cells.
Sigmoidoscopy	Lax redundant mucous membrane; small ulcers.	Bleeding easily; granulation tissue; rigidity.	Granular diffuse inflammation with narrowing; miliary abscesses and ulcers.
Sequela	Appendicitis.	Localized stenosis.	Stenosis, perforation, hæmorrhage, endocarditis, septicæmia.

[1]Modified from P. H. Manson-Bahr.

organisms. Presence of an exudate indicates inflammation. Cultural examination for pathogenic organisms—pyogenic, dysenteric and of the salmonella group—is necessary. At least six specimens of fæces must be searched for *Entamœba histolytica*.

Examination of the Blood.

Estimation of the hæmoglobin and cell content of the blood must be made at frequent intervals. Serum proteins give an indication of toxic effects. Agglutination tests are performed and if there is pyrexia, incubation of the blood may provide valuable information.

Radiography.

A barium clysma is of great value in determining the extent of the lesions and in excluding carcinomatous infiltration, polyposis, stricture *et cetera*, but an accurate diagnosis of the state of the colon cannot be made by means of a silhouette. A picture resembling the late stage of colitis may be presented when no ulceration is demonstrable, functional disorders of motility are often indistinguishable from those due to inflammatory lesions, and it is rarely possible to examine adequately the rectum, the recto-sigmoidal junction and the distal portion of the sigmoid colon by this method.

Table II.[1]

Clinical Feature or Investigation	Granular Procto-Colitis.	Ulcerative Procto-Colitis.
Frequency of occurrence.	Common.	Uncommon.
Elasticity of bowel.	Normal.	Impaired; spasm; stricture.
Defæcation	Painless.	Painful.
End results	Resolution even after six years.	Never returns to normal; stricture, "polyposis", deformities.
Stools ..	Diarrhœa; blood and pus.	Similar.
Toxæmia	Temperature 99° F. Pulse 100.	Temperature over 100° F. Pulse 100–140.
Clinical appearance.	Fairly well; bloody stools alarm but do not harm.	Secondary anæmia; loss of weight; dehydration; weakness.
Sigmoidoscopy.	Mucosa granular, moist, vivid pink; bleeds easily; shallow pitting.	Granular or ulcerated mucosa with diffuse inflammation; narrowing; bleeds easily; miliary abscesses; deep ulcers.
Biopsy ..	Tubular glands present with interglandular inflammation.	Whole thickness and tubular glands destroyed in localized areas; acute inflammation of intervening mucosa.

[1]Modified from E. T. C. Milligan.

A drastic purgative must never be given to any patient suspected of having colitis prior to this examination because of the real danger of precipitating a severe relapse. The examination itself causes some general and local disturbance.

Other Tests.

A fractional test meal examination is not of any diagnostic value, but information regarding gastric secretion is sometimes of value in the management of the condition.

Tests for allergy should be performed if there is any reason to suspect an allergic factor to be of significance.

Mantoux and Wassermann tests should be performed as a routine procedure, and it is always desirable to examine the chest radiologically.

Treatment.

1. *Toxæmia.*—Chemotherapy is a means of combating infection within the lumen of the gut and some attempt must be made to destroy organisms actually in the wall of the bowel. It is well nigh impossible to determine whether organisms susceptible to sulphonamides or penicillin are present unless they are isolated in cultures of the stool, and whether such organisms are causative cannot be proved; but there is reason to believe that toxæmia is at least in some measure controlled by antibiotics. Sulphaguanidine is ineffective and the preference is for one of the least absorbed sulphonamides, namely, phthalylsulphathiazole and penicillin, used simultaneously. Full doses should be given, and although the manufacturers recommend that phthalylsulphathiazole be used with an initial dose of 1·5 grammes followed by 0·5 gramme four hourly, larger doses of 1·0 to 2·0 grammes four hourly appear in some instances to be more effective. The drug may be required for six to eight weeks. Penicillin is probably destroyed rapidly in the wall of the bowel and accordingly doses of up to one million or more units per day may be necessary. I have used such doses, and the largest dose, apparently effective in prolonged pyrexia, was eight million units in five days.

The patient must be kept at rest in bed and very large quantities of fluid must be given.

2. *Malnutrition.*—In addition to fluids which will overcome dehydration, the diet must be carefully arranged to provide food with a high caloric value (3000 or more Calories), high protein, high carbohydrate, and high vitamin content but little residue. The residue must be soft and not mechanically irritating. The appetite must be stimulated by attractive meals and as far as possible the likes and dislikes of the patient must be studied. Dextrinized starch, malt and lactose may be used with advantage. Fluids thickened with powdered skimmed milk provide concentrated nourishment and a valuable means of increasing protein. Chocolate, malt, cocoa *et cetera* are useful for flavouring as well as for food value. Milk should be boiled or citrated to prevent curd formation. Ice cream is popular. Potato, eggs, milk, tomatoes and oranges are the most likely offenders if allergy is suspected.

Vitamins are given to supplement those in the diet and of greatest importance are *A*, *B*, *C* and *K*. All of the principal components of the *B* group are required and because of the relatively low fat content of the food, riboflavin may be required in large doses. Vitamin *K* may assist in controlling bleeding.

Increases in diet must be made gradually and as a more normal diet is resumed during recovery care must be taken to avoid indigestible substances.

3. *Anæmia.*—Frequent transfusions of blood will correct anæmia and it is essential to maintain the blood as close to normal as is practicable. Frequent small transfusions are preferable to infrequent large ones.

Serum protein can be kept at a fairly normal level by means of a high protein diet and transfusions; but the effect of transfusion or intravenous injection of serum is very short-lived in this respect.

4. *Psychogenic Factors.*—Social, economic and domestic difficulties must receive attention and the assistance of the psychiatrist is sometimes necessary. Occupational therapy during the period of inactivity and during convalescence is advantageous.

5. *Symptomatic Treatment.*—Pain, diarrhœa, excessive flatus, hiccup, malaise, headache, cramps and disturbed sleep must be relieved, and antispasmodics, sedatives and absorbents are very useful. Morphine in full doses must be used if necessary, but as infrequently as possible and under strict control. It is particularly valuable in the early stages. A combination of phenobarbital, codein and belladonna has proved very useful. Charcoal and kaolin are helpful. Minor alterations in diet may have marked effects.

"Carbarsone", "Yatren", hog's intestine, thiouracil, medicated enemata, bowel washouts and many other allegedly useful preparations and procedures have failed to impress and it is always difficult to assign cause and effects.

I have not used antidysenteric serum and am of the opinion that its use as described by Hurst is unwarranted now that chemotherapy is available.

6. *Surgical Treatment.*—Ileostomy is the only surgical procedure which can be effective in affording some rest to the damaged colon and it is surprising to see the improvement in the general condition of the patient after this operation; but operation should not be a last resort in the treatment of a moribund patient. If there is progression of the lesion, continued loss of weight and strength, uncontrollable toxæmia and a certain diagnosis

of ulcerative colitis, ileostomy should be performed without delay. Colectomy must follow and the ileostomy will probably have to be permanent. Only if the rectum has not been involved is it reasonable to consider subsequent anastomosis of the ileum to the rectum.

Surgical complications such as abscess, fistula, stricture and perforation must receive appropriate treatment.

7. *Complications.*—Lesions remote from the colon must be treated as necessary, but removal of the colon is the only sure means of obviating such complications.

Summary.

The clinical history and physical examination of the patient are of the utmost importance in the diagnosis of ulcerative colitis; it has variable modes of onset, course, and clinical features which are described.

The clinical features of the disease can be understood if the pathology of the condition is considered. The personality of the patient, evidence of toxæmia, disturbances of nutrition, anæmia, intestinal manifestations, and local and remote complications are discussed in some detail and the variable course of the malady is given as one reason for conflicting opinions regarding the efficacy of remedial measures.

The diagnosis can be established by the exclusion of specific causes of colitis (especial care being necessary to exclude amœbic infection) and of other organic lesions of the colon and by recognition of the characteristic features in the mucosa of the rectum and colon. The most important investigation which should be used for any patient suspected of having a lesion of the colon and rectum is sigmoidoscopy.

Attention is directed to the close similarity between granular procto-colitis and an early stage of ulcerative colitis. Recognition of the former condition is of great importance because of its benign course.

The medical treatment of ulcerative colitis is discussed, emphasis being placed on chemotherapy, dietetic measures and blood transfusions. Ileostomy to be followed by colectomy is advised if there is progressive deterioration despite medical treatment.

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THE INDICATIONS FOR TONSILLECTOMY.[1]

By STEPHEN SUGGIT,
Brisbane.

THE debatable subject of indications for tonsillectomy was suggested by Dr. Alan Lee. When the great majority of Brisbane's ear, nose and throat specialists were away on active service it did not appear to him that the civil population suffered any serious ill during their absence.

In some cases the necessity for tonsillectomy is undisputed; but in others the evidence is less convincing. This is well summed up by Taillens in a recent text-book by a group of Swiss teachers: "*Die Indikation der Adenotomie ist zwingend, diejenige der Tonsillektomie relativ. Die erste ist ein Axiom, über die zweite kann man diskutieren!*" ("The indication for removal of adenoids is absolute, that for tonsillectomy is relative. The first is an axiom, but in the latter case discussion is permissible!")

I shall first discuss the disasters or lesser ills that may befall a patient who by luck or design has managed to hang on to his tonsils.

The first is retropharyngeal abscess, a collection of pus between the posterior pharyngeal wall and the cervical vertebræ. Tonsillar infection spreads by suppurative lymphangitis to the retropharyngeal glands of Henle. These glands atrophy between the third and fifth years of life. Such an abscess opened early and carefully clears up without disaster; but a spontaneous rupture may lead to aspiration pneumonia. A more serious event is arrosion of the internal carotid artery. This complication has been more frequent since the use of sulphonamides and penicillin combined with unjustifiable delay in surgery. Rarely osteomyelitis of the bodies of the cervical vertebræ has followed retropharyngeal abscess.

The comparable abscess in the adult is a quinsy, an abscess lying between the tonsil and the pharyngeal wall, in 98% of cases behind the anterior part of the tonsil. The danger of a quinsy's bursting spontaneously and flooding the air tubes is less than that of a retropharyngeal abscess, but is by no means absent.

FIGURE I.
Case 7407, January 24, 1947, male patient. Left paralaryngeal abscess ten days after beginning of tonsillitis.

Infection from a quinsy may spread down the lateral wall of the pharynx, producing a paralaryngeal abscess.

Figure I is the laryngeal mirror picture from a warrant officer in the Royal Naval Hospital at Haslar, Portsmouth, to whom I was called down in the winter of 1947. Ten days previously tonsillitis had begun, and some two or three days before I examined him, progressive œdema of the larynx and a swelling, external to the larynx and extending to the angle of the jaw, appeared. Intramuscular injections of penicillin had been begun, but the ear, nose and throat specialist had misgivings that this was a pyriform fossa carcinoma, which it indeed resembled, and wished me to see it before performing tracheotomy. By the time the signal had reached me via the Admiralty and I had reached Haslar, the magic mould had done its work, the necessity for tracheotomy had passed and the external swelling had subsided.

Other complications of quinsy are arrosion of arteries (the internal carotid, the palatine branch of the ascending pharyngeal, the lingual and inferior palatine branch of the external maxillary), thrombosis of the internal jugular vein, and metastatic abscess.

Though a quinsy usually results from an air-borne infection to the tonsils, I have encountered a case of interest in which apparently this was not so.

[1] Read at a meeting of the Queensland Branch of the British Medical Association on August 6, 1948.

Not long before the war I was called by a thoracic surgeon, a colleague of mine, to examine a friend, a visiting thoracic surgeon from Copenhagen, with indolent quinsy, which we watched for a day or two before incision and release of pus. This surgeon had cut his finger some three weeks before while opening an empyema. A paronychia developed and removal of the finger nail was suggested. Being a surgeon, he preferred conservative treatment, which turned out quite successfully. Towards the end of the third week this quinsy had developed. There was no history of previous tonsillar infections.

Tonsils are the primary source of infection in many parts of the upper respiratory passages, in acute laryngitis, in ear infections and in sinusitis. Acute laryngitis is of more serious import in children, with their relatively small larynges; but even in adults œdema of the larynx due to hæmolytic streptococcal infection may necessitate tracheotomy.

Acute *otitis media* and mastoiditis are not uncommon sequelæ of tonsillitis, certainly in the Old Country. Penicillin has reduced, but by no means abolished, the severity of *otitis media* and the incidence of mastoiditis. In children adenoids are often accused, but it is quite wrong to exonerate the tonsils and blame everything on the adenoids. In this respect tonsil remnants cause more trouble than the original tonsils.

An infection of the antrum dripping pus into the nasopharynx may provoke tonsillitis, but the reverse also occurs. An acute antrum infection is a not uncommon complication of tonsillectomy. During the first out-patient session I took in Brisbane I encountered an acute antrum infection in a man whose tonsils had been removed five days before. Pain in a single joint, such as the wrist, may follow acute or subacute attacks of tonsillitis, recurring with each attack. This is distinct from acute rheumatism and removal of the tonsils cures the condition.

There is no clear evidence that the presence or absence of tonsils has any effect on the incidence of pulmonary tuberculosis due to the human bacillus. When tuberculosis bacilli enter the tonsils they are passed to the cervical glands. Cervical adenitis is nearly always due to the bovine bacillus and the tonsils are the portal of entry. Infection of these glands with the human bacillus is seen only in generalized hæmatogenous spread.

We operated on a young seaman with a cervical swelling, which we thought was a branchial cyst, in a hospital ship during the early part of the war. It turned out to be a circumscribed caseous gland with a cord-like tract leading up to the tonsil. Culture of organisms was prohibited in ships, but I am certain this was bovine infection.

Apart from the dangers of tonsillitis to the individual there is the danger of transmission from individual to individual, the organism gaining in virulence by passage. The sociological problem begins in a small way in school days, but assumes a greater importance in young adults. The milk and drapery trades in London are almost exclusively in the hands of the Welsh, and many young girls leave the valleys of South Wales to take employment with these firms in London. Like those of most country people their tonsils are large but also innocent, and they have never been subjected to the repeated droplet infection of the town dweller. These tonsils have remained immature and not undergone fibrosis and involution under repeated low-grade infection. It is common to see these young adults go down with tonsillitis soon after their arrival in London. During the recent war we saw this happening on a vast scale among the young service personnel, who without previous immunization were thrown together in barracks and mess decks. This age period provides the greatest number of tonsillectomies, and this is one explanation of the drop in ear, nose and throat work among the civil population when the most susceptible material has been mobilized.

During 1946 and 1947 I collected relevant data from records at the medical department of the Admiralty for the naval ear, nose and throat section of the official history of the war. One investigation I did was to work out a nosological table of ear, nose and throat diseases of a group of naval hospitals. I had intended to include every naval hospital and hospital ship, but this was too vast an undertaking and I limited it to a cross-section. The total for nine hospitals in the United Kingdom, one Royal Navy Auxiliary hospital overseas and one hospital ship for the period of the war was 15,381 cases of tonsillitis, representing 49·6% of all ear, nose and throat diseases.

My own cases on active service numbered 574 or 18·8%. This percentage is smaller because I was dealing with chronic tonsillitis, almost entirely operation patients, and patients with acute tonsillitis were always kept in medical wards well away from the "clean" ear, nose and throat patients.

It is seen that the loss of service time was very great. All these patients were in hospital for several days. I was able to get the records of two interesting epidemics, which are shown in the following tabulation.

Invasion of Somaliland: His Majesty's Ship *Shropshire* at Durban.—January 19, 1941, a corporal of marines developed a quinsy. January 24, one case of tonsillitis; January 25, three cases; January 26, 17 cases; January 27, 16 cases; January 28, 23 cases; January 29, 11 cases; January 30, 25 cases; January 31, 12 cases; February 1, 10 cases; February 2, 12 cases; February 3, 13 cases; February 4, four cases.

All infections arose in different messes, but there was no case among the officers. The men were accommodated partly on board and partly ashore. Temperatures ranged from 99·2° to 104° F., and debilitation was severe.

Battle of Cape Matapan: His Majesty's Ship *Ajax*.—The first case occurred on March 28, 1941, the day before the battle of Cape Matapan. After the battle, the following cases arose: March 31, one case; April 1, 45 cases; April 2, 73 cases; April 3, 21 cases; April 4, seven cases; April 5, one case; April 6 and later, sporadic cases.

Quinsies were frequent in this series. Of the patients 30% had a rash. Some had circumoral pallor, but there were no strawberry tongues. There were no cases among the officers or warrant officers. The infecting agent was considered to be probably a food-borne hæmolytic streptococcus, the effect being aggravated by the ship's being closed up for action stations. This shows the potency of tonsillitis in a ship closed up for action stations.

Now that we have considered some at least of the evils that may arise from tonsil infection, it is reasonable to consider the disasters that may follow tonsillectomy—the risk that is run by the patient submitting himself to operation.

Primary hæmorrhage may follow inadequate hæmostasis before the patient leaves the operating table or the slipping of a ligature. Whether conservative methods in the ward are sufficient or whether it becomes necessary to take the patient back to the operating theatre, primary hæmorrhage does not, due care being given, carry a major risk.

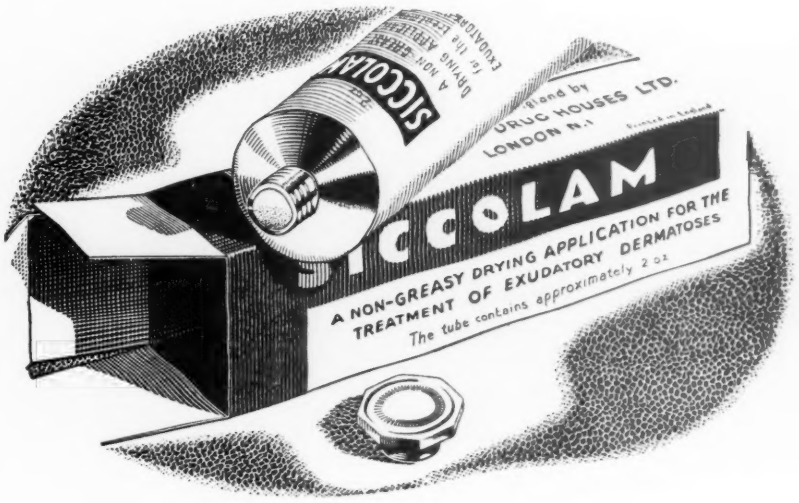
Secondary hæmorrhage may consist of slight hæmorrhage on the fifth or sixth day, due to separation of a small slough or ligature. It is not true secondary hæmorrhage and usually responds to simple measures. True secondary hæmorrhage due to sepsis is a serious condition. Blood transfusion is the most effective single weapon in its control. No patient will ever die of hæmorrhage if blood transfusion is given in time. I have known two deaths occur when this was not done in time. For that reason, in London, tonsillectomy patients, both adults and children, are retained in hospital for a week.

Hæmophilia is an absolute contraindication to tonsillectomy; but a statement by the patient that he bleeds easily is not necessarily a contraindication. The patient's statement must be considered and clotting and bleeding times investigated. If these prove normal, operation may be safely performed.

Cervical adenitis occurs occasionally. I have seen it more often when tonsils have been removed under local anæsthesia.

Acute antral infection and *otitis media* are not uncommon complications. Acute *otitis media* is more frequent in children than in adults.

These manifestations of sepsis, secondary hæmorrhage, adenitis, and sinus and ear infections may result from two sources—either from operation too soon after an attack of acute tonsillitis (less than three weeks for a child and



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less than four or five weeks for an adult) or from cross-infection in the operating theatre or the ward. The latter occurs more often. The practice here of discharging tonsillectomy patients from hospital within two days of operation reduces but cannot exclude such cross-infection. They are, moreover, exposed to the hazard of infection at home while the tissues are still unhealed. I am sure that in the mild climate of Queensland the hæmolytic streptococcus is less rife and less potent than in the sterner climate of London.

During my days as a student the ear, nose and throat department of my old hospital in London, a new and separate block, was afflicted with epidemics of cross-infection and was regarded by the general surgeons as a lazar house. This state of affairs culminated in 1932 with an outbreak in which three healthy young men admitted to the same ward for tonsillectomy died in rapid succession from bronchopneumonia, the infecting organism being traced to a patient with advanced carcinoma of the larynx who had undergone a tracheotomy. An exact and prolonged investigation was carried out by Okell and Elliot. The inquiry was begun in February, 1933, and continued until August, 1936. During the first few months of this period

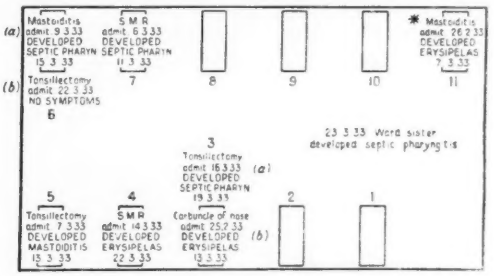

FIGURE II.

After Okell and Elliot (1936). Outbreak I. Ward M (males). Streptococci type VI recovered from all patients after development of symptoms.

I was house surgeon and in the later part clinical assistant and deputy registrar in the department, and I witnessed the transformation that followed these investigations and the recommendations that were adopted. "During the period of three and a half years fourteen outbreaks of cross-infection were tracked, six in 1933, five in 1934, two in 1935, and one in the early months of 1936. Not only the number of outbreaks, but their clinical severity became less." The throat and nose and any likely lesions of all incoming patients were swabbed and hæmolytic streptococci were isolated if present. The patients, the nurses, wardmaids and so forth had swabs reexamined every week, and the redistribution of their streptococci was followed. "Bacteriological findings were linked with clinical occurrences in the wards." Figures II and III are taken from the paper published by Okell and Elliot (1936). The upper diagram in Figure II shows the male ward. The star indicates the probable source of infection. Note that in the second case a tonsillectomy patient, admitted to bed 6 had a latent infection. The lower diagram represents the female ward. Latent infection was found in the first patient admitted to bed 11 (nasal polypi). There was also one case in the children's ward—scarlet fever following a mastoid operation. Streptococcus type XV was discovered. Two infected wardmaids from ward F had done relief duty in ward C. Figure II shows the children's wards. One patient admitted to hospital for tonsillectomy died from septicæmia in this epidemic. In one of the later outbreaks eight patients, two house surgeons and one nurse were affected, ten had manifest infections and one a latent infection.

Shortly before this epidemic one of the ear, nose and throat house surgeons died in eight days of a type III pneumococcal pneumonia, presumably picked up in the wards.

The investigators' recommendations were adopted and are now in use, though modified to some extent in the light of practical experience. (i) Obviously infected patients are placed in separate wards from relatively "clean" patients admitted for operation. There are some single-bed and two-bedded wards on the same floor as the larger wards. (ii) Beds, placed prior to the investigation with centres eight and a half feet apart, are now placed with the centres seventeen feet apart. Additional space was found by placing beds on the sun balconies both in winter and in summer. These two factors alone were in my opinion the two most strategic. (iii) While the dressings were done masks were worn incorporating "Cellophane", and gloves were also worn. There was some relaxation in regard to gloves during the shortage immediately after the war, but this is now being tightened up. It follows, of course, that in the operating theatre aseptic technique must be of the same standard as that used in general surgical theatres. (iv) Patients who are obviously infective or whose swabs yield positive findings are screened off by glass screens seven and a half feet high. This is necessary only when the isolation wards are otherwise occupied.

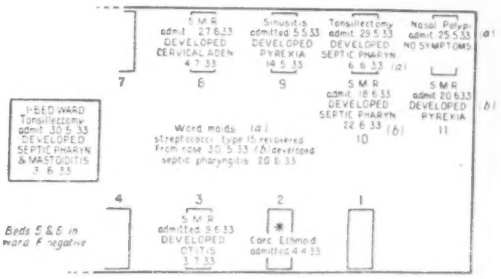

FIGURE III.

After Okell and Elliot (1936). Outbreak II. Ward F (females). Streptococci type XV recovered from all patients after development of symptoms.

Tonsillectomy is fraught with danger in cases of generalized rheumatism (I omit those cases of recurrent single joint pain following attacks of tonsillitis). Higbee (1946) suggests that removal of apparently normal tonsils in cases in which an hereditary tendency to rheumatic fever is known to exist may be justified as a prophylactic measure. There is no doubt that in cases of incipient rheumatism tonsillectomy may precipitate an attack.

Illingworth (1939) published his investigations of 301 cases of acute nephritis in children and of 64 cases in children not examined during the acute attacks at Great Ormond Street. Of these, 20·2% had undergone tonsillectomy in contrast to the general incidence of tonsillectomy in the children of London, which was 9%. In one table Illingworth shows 16 cases in which tonsillectomy was considered the cause of the attack; in four *otitis media* had intervened between tonsillectomy and nephritis. In a second table Illingworth shows the incidence of post-operative exacerbations in relation to the duration of the disease before operation: 119 cases, 28 exacerbations. There were two deaths, one of which is not included in this table. Of the cases in which tonsillectomy was carried out as a therapeutic measure, 84% of the children had abnormal urine on their discharge from hospital. Of the patients who did not undergo tonsillectomy, 86% had abnormal urine on their discharge from hospital. Illingworth considered that in no single case had tonsillectomy any beneficial effect on the nephritis.

Lung abscess is not frequent, but when it does occur it is a disaster. Most abscesses occur in the lower lobe (60%), and mostly on the right side. Leegaard (1939) reported the occurrence of mild bronchopneumonia in 0·2% of patients after 1007 tonsillectomies under local anæsthesia in the period from 1923 to 1938, and published his investigations in 109 tonsillectomies on patients over

fourteen years of age. These were operated on under local anæsthesia in the Rikshospital, Oslo. In the first group of 50, indirect laryngoscopy was performed immediately after the operation and thence every hour. In the second group of 59, iodized oil was injected into the tonsillar fossa during dissection and serial X-ray pictures of the chest were taken.

When preliminary application of cocaine to the palate and pharynx was made streaks of contrast were seen in the lungs more frequently than in cases in which surface anæsthesia was omitted. Leakage into the bronchi was seen more often when the patient was operated on in the sitting position than when the operation was performed with the patient lying down.

In 36 X-ray films of the chest showing contrast in the bronchi the distribution was as follows: right lung, lower lobe, four; right lung, middle lobe, sixteen; right lung, middle and lower lobes, six; left lung, lower lobe, seven; trachea, three.

For the last decade or more tonsillectomy in large centres in the Old Country has been performed under closed circuit nitrous oxide, oxygen and ether anæsthesia

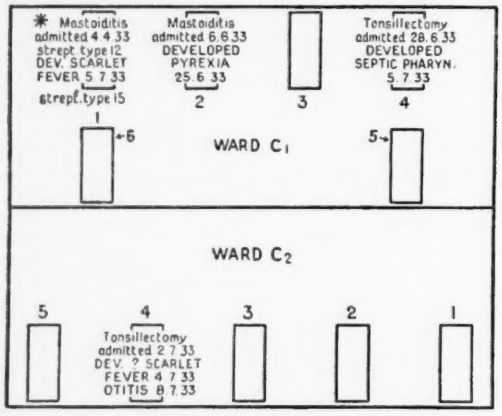

FIGURE IV.

After Okell and Elliot (1936). Outbreak III. Wards C_1 and C_2 (children). Streptococci type XII recovered from all patients.

or, more recently, under "Trilene" anæsthesia. In the case of older children and adults the agent is given through nasal intratracheal tubes and the larynx is packed off with a long swab. In the case of younger children nitrous oxide, oxygen and ether are given by the Davis gag. Some anæsthetists use intratracheal tubes even for small children, but I think that this is unnecessary and not without risk for the small calibre larynx of a small child. "Pentothal" induction is frequent. Carbon dioxide is available if necessary to "wash out" the anæsthesia and to secure a rapid return of the cough reflex. From what I have seen, the same procedure is in use in the southern States. It is many years since I saw a chest complication after tonsillectomy. Closed circuit anæsthesia has the great advantage over "open" ether anæsthesia that far less vapour is used, the stage of anæsthesia is always under control, with rapid recovery of the cough reflex, and the airway is shut off from the operation field—quite apart from the less important fact that the surgeon is not anæsthetized as well as the patient. There is one danger—failure to remove the laryngeal pack. If the surgeon, anæsthetist and theatre sister remember their duty this will not occur. It is even more important in ear, nose and throat operations to count the swabs than in abdominal operations.

Tonsillectomy should not be performed on patients suffering from tuberculosis unless the disease has been quite quiescent for some years, and even then only when local tonsillar sepsis is severe enough to cause serious ill health. The risk of reactivating pulmonary tuberculosis is as great if the operation is performed under local anæsthesia as under nitrous oxide, oxygen and ether.

Some months before the war I examined a young man with recurrent sore throat, who had an established artificial pneumothorax and quiescent tuberculosis. I did not feel that the amount of tonsillitis justified the risk, even though the physician in charge was prepared to allow tonsillectomy, if I thought it was necessary. I saw the patient again about a year ago. His tonsils and sore throats were no worse. Out of curiosity I asked him what he had been doing with himself during the past eight years. He replied that he had volunteered for the army at the outbreak of war, thinking that a staff job would be safest for his chest. He went through the Officers' Corps Training Unit course, got his commission and spent the rest of the war at General Headquarters, Delhi. He confessed he had some dyspnœa during his Officers' Corps Training Unit physical training course.

The summer of 1947 in England was exceptionally long and dry, and we had our first really serious poliomyelitis epidemic. Tonsillectomies were stopped from early July until November. Walshe stated categorically that to perform tonsillectomy in a poliomyelitis epidemic was criminal, and this I think is the generally accepted view in all countries. Roberts (1946) investigated the statistics of the incidence of poliomyelitis in tonsillectomy in the United States of America for the past thirty-five years. The conclusion is that the average incidence of poliomyelitis in everyday life is thirty-one times greater than in the recently tonsillectomized population even during the poliomyelitis season. Nevertheless, none of us would be anxious to take the risk of operating during an epidemic, whatever the statistics.

Our aim in selecting subjects for tonsillectomy is to protect the patient against recurrent tonsillitis, to prevent repetition in the same patient of retropharyngeal abscess, quinsy or acute laryngitis and to protect society against carriers of droplet infection. It must also be our aim to avoid operation when the patient is subjected to unjustifiable hazards. It is easier to make the decision in regard to adolescents and young adults, and these are the patients who benefit most by operation. In the case of children it is more difficult to decide. Only exceptionally should tonsillectomy be performed before the age of five years. Mere tonsillar enlargement is not sufficient, as Leathart (1938) stated:

> The child is often sturdy and well nourished: his tonsils are enlarged because an organism is present to which immunity is required in the interests of his future health. Auto-immunization is progressing satisfactorily, and when complete the tonsil will shrink from an enlarged soft, succulent functioning organ to the fibrosed and atrophied organ of the adult.

Enlargement is nevertheless sometimes sufficient, without infection, to cause respiratory obstruction. More difficult is the flabby child, who is not doing well, has a poor appetite, and moderate tonsillar hypertrophy with mild attacks of upper respiratory infection. The observations of the family doctor over a period carry more weight in this group than clinical appearance, and each case must be weighed on its merits against the hazards of surgical intervention. In doubt, operation should be postponed and the child examined at intervals.

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INFANTILE CEREBRAL PALSY.[1]

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Definition.

Infantile cerebral palsy, frequently loosely referred to as "spastic paralysis", is a term used to cover a group of closely allied crippling conditions in children in which there is defective muscular control. This may manifest itself in paresis; hypertonia of some muscles; defective balance; defective coordination, sometimes with associate hypotonia; the presence of repetitive involuntary movements or tremor of an intention or non-intention type. It is non-progressive.

Distribution.

There has been no adequate survey in Australia or in any of the States.

American figures[(1)] give an incidence of seven cases among children born each year per hundred thousand of the population. Of these affected children one to two will die in infancy. With an Australian population of approximately seven million as a basis for calculation there will remain 350 affected children each year, that is, about 4200 under the age of twelve years.

The sex distribution is five boys to four girls affected.

Ætiology.

The condition is produced by any factor which causes damage to or defective development of cerebral or cerebellar sensorimotor areas or tracts.

The most frequent ætiological factor is intracranial damage just before, at or just after birth. This may be due to hæmorrhage of the traumatic or non-traumatic type or to cerebral anoxia associated with asphyxia, apnœa or anæmia.

Another problem now looming large on the horizon is damage associated with *icterus gravis neonatorum* arising from parental Rh incompatibility. These babies are given transfusions and the majority of them saved, only, in many cases, later to show signs of widespread brain damage, involving motor factors, special senses and, frequently, some degree of amentia.

Less frequently damage is brought about by infection either through the mother during pregnancy, from rubella, kidney disease or syphilis, or acquired by the child after birth from encephalitis or meningitis, which may occur as sequelæ to measles, mumps, whooping cough or diphtheria.

Less frequent still would appear to be the agenetic factor, associated with a familial history or possibly a Mendelian recessive inheritance, and those cases in which other agenetic stigmata occur.

History.

Features of the usual history are as follows: either a long labour and a difficult birth, with or without forceps delivery, usually in the case of the first child, or precipitate birth; premature birth with or without maternal nephritis, hyperpiesis or eclampsia; pronounced apnœa at birth; heavy jaundice on the second or third day, or a blue or white shocked state followed by a "sick" state with or without signs of cerebral hæmorrhage. Sometimes there is difficulty in sucking. In from a few days to ten weeks the baby gets better and in the majority of cases progresses apparently normally. Most frequently the first thing that the mother notices is that the child is not sitting up by nine to twelve or maybe fifteen months. She seeks advice and is generally told that she has a "lazy baby", but not to worry; the baby will be "all right". Some babies are given thyreoid. That is, the history dates from birth, the condition becoming evident as the various activities dependent on the maturing nervous system do not appear at the expected time or are distorted, and, as time passes, there appear the defects of faulty head control and extraneous movements or overacting muscles and associate deformities, and often anarthria or dysarthria.

Clinical Types.

The mass of physical, mental and sensory defectiveness presented by this condition falls into five fairly well-defined clinical types, namely, the spastic, athetoid and ataxic, and the less frequent types characterized by rigidity and tremor. One or more limbs or parts of the body may be affected in each type.

The Spastic Type.

The spastic type is characterized by hypertonia or "spasticity" of muscles, usually associated with some loss of power. The adductors and flexors of the upper and lower limbs and the pronators of the forearms are the most usually affected muscles. The stretch reflex is characteristic and occurs as an uncontrollable contraction of spastic muscle when its antagonist is contracted. If the legs are affected, Babinski's sign is usually present. The tendon reflexes are hyperactive and clonus may or may not be present. The cremasteric and abdominal reflexes are diminished or absent.

The Athetoid Type.

The athetoid type is divided into two kinds: "non-tension" and "tension". In the "non-tension" type repetitive involuntary free movements occur, particularly when the child attempts a directed movement. In the "tension" type of athetosis, involuntary, repetitive, tense movements occur, and it is postulated that the child endeavours to prevent involuntary movements by tensing himself, this giving rise to a state often interpreted as spastic. The difference between the "tension" and "non-tension" types of the athetoid group is as that it is as though in the "tension" type there had been built up early in life a conditioned reflex directed to stabilization. In some cases when the child is involuntarily relaxed, for example, when going under or coming out of an anæsthetic, free athetoid movements occur. Most probably the conditions are due to different lesions. The stretch reflex is absent, the tendon reflexes are normal, Babinski's sign may or may not be present. No clonus is present. The cremasteric and abdominal reflexes are usually active.

The Ataxic Type.

The ataxic type is characterized by defective balance, frequently defective or slow coordination of limbs, particularly the upper, when the child is standing, and often hypotonia of voluntary muscles, tilting of the head and neck or a "wobbly" head. The characteristic gait consists in walking on a wide base with locking of each hip and knee joint, the knee joint being in hyperextension, as the corresponding leg takes the body weight. The arms are usually extended from the shoulders and flexed at the elbows to improve balance. The reflexes are usually diminished.

Tremor.

In the types associated with tremor there are involuntary reciprocal contractions, regular in rhythm. In the intention type, contractions occur only on attempted movement. In the non-intention type contractions are present at all times. The tendon reflexes may or may not be present. There is no clonus. The cremasteric and abdominal reflexes are usually active.

Rigidity.

The state of rigidity, which is frequently associated with pronounced amentia and microcephaly, is characterized by a stiffness of muscles, and on examination the joints flex or extend slowly. There is no stretch reflex and the reflexes are variable. The rigidity may be constant or intermittent.

Clinically these types may occur in the pure form or in mixed form, for example, spastic athetoid, athetoid spastic,

[1] Read at a meeting of the Section of Neurology and Psychiatry, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

ataxic with tremor. The special senses, particularly sight and hearing, may be involved, together or separately, concomitantly with any type, and should be investigated before intelligence is condemned.

Dysarthria with or without hypophonia may occur and is of a different kind in each type. Also a "motor" type of aphasia sometimes is present. Intelligence varies from the expected inherited potential down to pronounced idiocy, depending on the initial brain damage. By intelligence I mean "the capacity for relational constructive thinking directed to the attainment of some end"; this as such does not presuppose the capacity for accurate motor activities including the motor aspect of speech. The Terman-Merill (1938) revision of the Stanford-Binet test for children who have had schooling, also the Merill-Palmer "Draw-a-Man" and Koh's tests, the time response factor being ignored, and the Gesell pre-school scale for children under five years have been used fairly succesfully in providing a pointer to basic intelligence.

Pathological Physiology.

In the spastic type the paresis appears to be due to damage to area 4 or the pyramidal tracts and the spasticity to area 4S or its pathways.

In the athetoid type the phenomena seem to be due to showers of impulses arising in higher centres as a response to afferent sfimuli of many kinds and are seen when there is damage to parts of the basal ganglia—the mesial and ventral parts of the thalamus, the *corpus Luysi*, the red nucleus and tracts leading to it from the cerebellum.

In the ataxic type, the phenomena appear to be due to damage predominantly to the cerebellum or frontal lobe and/or cerebro-cerebellar interconnexions.

Treatment.

Treatment consists of getting the best response from residual capacities and is really building a person. It must be directed to education and physical independence including ambulation.

Orthopædic procedures with tendon elongation or section, joint stabilization and manipulation and application of plaster, also peripheral nerve section, are useful in the spastic type, but of little value in the athetoid and ataxic types. Central neurosurgery is of value in some cases of athetosis. Suitable braces may be of use in all types.

Recently drugs, as "antispasmodics", are being tried: "Tridione" given orally in the tension athetoid type; tubocurarine-in-oil given by injection in the spastic and athetoid types; "Prostigmin" given orally or by injection in the spastic type.

An attempt should first be made to assess intelligence before treatment. If doubt exists attempts should be made to ascertain what response the child will make to adequate and directed stimuli in the form of occupational therapy for a trial period.

Along with orthopædic and neurosurgical procedures much can be achieved through individually prescribed physiotherapy, occupational therapy and speech therapy.

In the application of these methods it must be remembered that it was the immature nervous system which was damaged. The child has not formerly had the capacity to perform an action and then lost it. Treatment should begin early, at the age of eighteen months if possible.

Physiotherapy for the spastic type consists in teaching the child to relax the spastic muscles and educating and strengthening the weakened ones.

For the athetoid type relaxation is taught in lying, sitting and standing, and movements are taught in the position in which they will be used; external stimuli must be reduced to a minimum during the teaching of activities.

The ataxic children are taught balance and coordination. Mirrors are used extensively in the early stages of training. Movements are taught in the position in which they will be used.

Occupational therapy is directed mainly towards self-help activities used in everyday life, and the whole personality must be developed; formal education, hobbies, sports, social behaviour, pre-vocational interests *et cetera* should be all directed to this end.

Diagnosis.

The diagnosis depends on the history together with the orthopædic and neurological findings.

Prognosis.

A good or fair prognosis depends firstly on the standard of basic intelligence, secondly on the degree and type of physical defect and speech involvement, and thirdly on adequate treatment.

The prognosis may be good for the mental state and fair or poor for the physical *et cetera*. A child may have above average intelligence, but be so physically affected that the execution of writing or even the using of an electric typewriter may be impossible. Formal learning, then, will be limited.

A Suggested Approach to the Problem.

Firstly, make an early diagnosis.

Secondly, carry out an investigation of the child's intelligence and special senses and of the ætiology. The ætiology is important in relation to the question of the parents' having further children.

Thirdly, classify the children according to intelligence. Educate and treat the educable, that is, those with an intelligence quotient of 70 or above. Those children with an intelligence quotient of 70 to 50, treat and train. For those with an intelligence quotient below 50, consider the social and psychological aspects of the family and, if these are applicable, direct them to a mental institution.

Reference.

(1) W. M. Phelps: "The Treatment of the Cerebral Palsied Child", *The Crippled Child*, Volume XVI, 1938, page 16.

ENCEPHALITIS AND ENCEPHALOMYELITIS.[1]

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IT is well to give some classification of encephalitis and encephalomyelitis and then briefly to refer to aspects of general and topical importance. The clinician needs to have a broad idea of the work going on in this field, even if its application to local conditions is not immediately apparent. Certain inflammatory diseases of the nervous system will not be discussed, although included in the broadest interpretation. I refer to those caused by pyogenic bacteria, certain protozoal and metazoal parasites and higher forms of vegetable life, such as the pathogenic cryptococci. Dr. Edmunds is dealing with toxoplasmic encephalitis. I had a patient with torulosis under my care in an army hospital in the Middle East. A tentative diagnosis was clinched by cerebro-spinal fluid examination and was confirmed *post mortem*. Rickettsial infections illustrate so-called incidental encephalitis well. Murine typhus or Brill's disease is extremely common here. Death is a rare event. In the only fatal case which I have seen the patient was stuporose or maniacal for several weeks, but detailed examination of the brain did not dislose anything resembling the lesions of louse-borne typhus described by Wohlbach, Todd and Palfrey[1] (1922) and by Spielmayer[2] (1922).

A recent classification by Greenfield[3] (1947) is as follows.

Type I.

Type I is virus encephalitis affecting the grey matter primarily or almost exclusively. Its forms are: (i) rabies, (ii) *encephalitis lethargica* and sporadic forms of unknown ætiology, (iii) poliomyelitis and polioencephalitis of the brain stem, and (iv) subacute encephalitis with intranuclear type A inclusion bodies (Dawson).

[1] Read at a meeting of the Section of Neurology and Psychiatry, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

Pasteur's discovery of the first neurotropic virus, that of rabies, in 1884, was epoch-making. Neurological complications following antirabic inoculation were reported in detail by Remlinger (1905), and lesions similar to those of post-vaccinal and measles encephalitis were found by Bassoe and Grinker[4] (1930). Will recent work, to be presently mentioned, on the demyelinating diseases confirm the theory that the injected emulsified nervous tissue is responsible (Ford,[5] 1946)?

Encephalitis lethargica of von Economo is for practical purposes extinct and other varieties are keeping researchers busy, especially in the United States.

Concerning terminology, we need to know what we mean when we use the word polioencephalitis. In my house-physician days, no doubt owing to the handing down of Strümpell's[6] (1884) description of cases, we tended to attribute all cases of infantile hemiplegia to polio-encephalitis (that is, poliomyelitis). They were obviously not examples of cerebral poliomyelitis. Bulbar or brain stem poliomyelitis is a preferable term, if we mean infection by the virus of poliomyelitis.

Very few cases indeed have been reported of subacute encephalitis with intranuclear type A inclusion bodies, as described by Dawson. One was reported by Swan[7] in Adelaide (1943). Is this a form of the *herpes simplex* virus? This will be alluded to later.

Type II.

Type II is encephalitis of both grey and white matter caused by a virus of pantropic type. Its forms are: (i) the St. Louis form, (ii) Japanese B encephalitis, (iii) eastern, western and Venezuelan forms of equine encephalomyelitis, (iv) Russian spring-summer tick-borne encephalitis, (v) herpes virus and louping-ill virus encephalitis in man, and (vi) subacute sclerosing encephalitis.

Some of these have, of course, caused concern in the United States. The existence of still more suspected virus encephalitides, which might affect man, is indicated by the presence of antibodies in human blood (Olitzky and Casals,[8] 1947). That many types of mosquitoes can act as vectors is established; and it appears that species already incriminated as vectors of the western equine and St. Louis encephalitis can also serve as laboratory vectors of the Japanese B encephalitis virus (Reeves *et alii*,[9] 1946). This is a disturbing thought.

Subacute sclerosing encephalitis has an uncertain position.

Kipping and Downie[10] (1948) have recently reminded us that the pathogenic potentialities of *herpes simplex* have perhaps not been sufficiently appreciated. They describe a case of generalized infection with the virus and quote from the literature fatal human cases of encephalitis caused by it. Burnet and Williams[11] (1939) have confirmed that aphthous stomatitis of infants is a herpetic infection. The work of Dodd, Johnson and Buddingh seems generally accepted (Bradbury,[12] 1947). The first report in Australia, as far as I know, of the terrible affliction known as Behcet's triple syndrome has been made in this State by O'Donnell[13] (1947). E. W. P. Thomas[14] (1947) has reported the first one in England. Thanks to O'Donnell's report, it was possible to recognize another case in this city. The unfortunate young man affected is still under observation. After years of suffering from severe stomatitis, now barely relieved by cocaine, and the destruction of one eye, he has recently had repeated epileptiform seizures with hemiparesis and variable stupor and confusion; yet he still lingers. I think Berlin's[15] (1944) case is the only one reported in which similar involvement of the central nervous system occurred. The patient died and widespread lesions were found in the brain. Here surely is something for virus workers to think about. We wish they could help us with our patient. We feel that previous unsuccessful attempts to isolate a virus are not necessarily conclusive.

Concerning zoster, the syndrome described by Ramsay Hunt is well known. Extension of this may occur. In 1940, with Dr. H. M. Hill and Dr. N. C. Cuthbert, I saw a patient who had blebs on the ear-drum, vesicles on the posterior pharyngeal wall, complete facial, palatal and vocal cord paralysis—all on the same side. The history, signs and course were almost identical with those in the patient of Negus and Crabtree[16] (1943). In this case vesicles were on the palate. They considered it unnecessary to postulate involvement of central motor ganglia. Cells in the geniculate, glosso-pharyngeal and vagal ganglia were affected, with subsequent paralysis of the motor fibres passing through. Ramsay Hunt's conception of an acute posterior poliomyelitis was held to be justified. Parkinson[17] (1948) has described some rarer manifestations of zoster which would be hard to explain on the basis of sensory involvement alone.

Type III.

Type III is post-infectious encephalitis (acute perivascular myelinoclasis). Its forms are associated with: (i) vaccination, (ii) variola, (iii) measles, (iv) influenza, (v) varicella, (vi) mumps, and a seventh form apparently occurring spontaneously.

Here we have the large group of demyelinating diseases. Perdrau's term "demyelination" has replaced the older "perivascular softening", and every candidate for a higher medical degree is expected to know about them. The varieties following vaccination in Holland, Germany and England became only too well known. Chinner[18] (1940) has described a representative series of cases following measles in South Australia. Laurence and McGavin[19] (1948) report cerebral complications during a large epidemic of mumps in the New Zealand Military Forces, and quote authors who have reviewed the literature. Although these are more properly placed under Type V, demyelination has been described.

We pass to consideration of some of the spontaneous varieties. Many little known ones need not be mentioned. E. W. Hurst[20] (1941) has given us a comprehensive account of the work in this field, in which he has played an active part. Earlier, with C. T. Ch. de Crespigny and H. K. Fry[21] (1939) he had expressed the opinion that disseminated sclerosis was comparatively rare in South Australia, whereas the less common demyelinating diseases seemed to occur with some frequency. Case reports were given. The position in this State is, I think, much the same. Disseminated sclerosis, as it occurs in England, is extremely rare. I have seen a mere handful of cases, and not one of these has occurred in a native of this State. On the other hand, I have seen about an equal number of the rarer diseases of this class within the last two years. These comprise two cases of *neuromyelitis optica* in a boy and a girl, aged nine and eleven years respectively. Three and possibly a fourth have had features resembling both *neuromyelitis optica* and Schilder's disease. I have no post-mortem proof, as no patients have died. The argument, however, is strong, but cannot be developed here. Dr. Ernest Beech's experience has been similar to mine. In the case of the boy aged nine years there was, along with nerve blindness, the most intense swelling of the retinal veins that I have ever seen.

Ford's[22] (1946) account of the retinal and other findings is excellent.

The student would gain the impression from many descriptions of this and Schilder's encephalitis that their course is fairly stereotyped. Uncertain statements arise from any one person's limited experience of the conditions. It does seem that Schilder's disease may show remarkable variations in its evolution as well as in its distribution (Symonds,[23] 1933).

Without introducing the well-known argument about their identity or otherwise with multiple sclerosis I would say that we seem to have here diseases with a superficial resemblance to it, but immediately or potentially more destructive; so that, resembling one another, they are yet different from multiple sclerosis.

The occurrence of a retrobulbar neuritis here is a matter for worry over the immediate rather than the remote future.

Whatever the relationship of these diseases, the results of recently renewed research along certain lines will be

awaited with interest. Demyelinating lesions are being produced more certainly and more quickly in monkeys and rabbits by inoculation with homologous brain tissue (Morrison,[34] 1947). The lesions have appeared much more quickly owing to the addition of adjuvants to the inoculum. Adjuvants are used by bacteriologists to enhance immune reactions, and they include killed tubercle bacilli, liquid paraffin and an ointment base known as "Aquafor". Interest has thus again been aroused in the possibility that the human diseases may be due to antigen-antibody reactions. We also learn that four of the seven principal members of the Cambridge team who were working on "sway back" have now developed a disease which "would be confidently diagnosed as disseminated sclerosis by any neurologist".[25]

Putnam[26] (1947) with others is putting to therapeutic trial his long-held view of "venule thrombosis as an essential link in the production of multiple sclerosis and related encephalomyelitis". He is using dicoumarol. Alpha-tocopherol is also being tried. In truth, as *The Lancet* says, recent contributions have been surprisingly diverse both in their approach and, superficially, in their implications.

Type IV.

Type IV is acute hæmorrhagic leucoencephalitis. This was first described and named by E. W. Hurst[27] (1941). He gives reasons for considering it as one of the most acute representatives of the demyelinating maladies. To say the truth, the experimental lesions just considered have closely resembled it, but at present it remains a type by itself. Shallard and Latham[28] (1945) have reported a case in New South Wales. Greenfield and Dorothy Russell[29] (1943) have also made observations upon it.

Type V.

Type V is meningoencephalitis of virus origin. Its forms are (i) lymphocytic choriomeningitis and (ii) meningoencephalitis of mumps.

A number of cases of benign lymphocytic meningitis occurred during the war in the Middle East. Investigation at the Central Laboratory in Cairo, if I remember rightly, yielded positive results for the virus of Armstrong and Lillie in considerably less than half the cases. The antibodies usually develop very slowly. A few cases seen here recently were probably examples of non-paralytic poliomyelitis. Other causes are well known.

Two years ago several of us examined a male of forty-six years. Over two months, until his death, the cerebro-spinal fluid contained a few hundred lymphocytes per cubic millimetre, increased protein and gave a moderate reduction of chlorides. The results of Wassermann tests of blood and cerebro-spinal fluid were negative. Cerebro-spinal fluid pressure was very high, and headache and neck stiffness were severe. Microscopic sections revealed little but an intense lymphocytic infiltration of the meninges. There was no question of tuberculous meningitis or torulosis. The sections were unfortunately lost. Leichenger, Milzer and Lack[30] (1940) report a persistently relapsing case. The virus was demonstrated. They refer to Skogland and Baker's patient, who had signs and symptoms of chronic meningo-encephalitis lasting one and a half years. Neutralizing antibodies were repeatedly demonstrated in the patient's blood. We had no means of investigating a possible virus causation in our case.

Conclusion.

For several slides[1] which illustrate some of the conditions mentioned, I am indebted to the president of our section, Dr. L. B. Cox.

In July, 1945, a British naval rating, aged twenty-one years, was seen by me at Perth Military Hospital. He had a high temperature, was emaciated and was quite unable to swallow. He had literally a terror of being offered fluids, a "hydrophobia" as it were. He died in a few days. We sent his brain and the upper part of the cord to Melbourne, where Dr. Cox's opinion was sought. Now, after some years, it is possible to show the specimen. It is almost certainly poliomyelitis localized to the bulb. We have recently had others as a result of the present epidemic.

Dr. Cox has also kindly provided sections from a patient who died of *neuromyelitis optica*.

[1] Dr. Moss showed a series of slides illustrating conditions referred to in his paper.

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PRESENT TRENDS IN PSYCHOTHERAPY.[1]

By W. WYATT, M.B., Ch.B., D.P.M.,
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IT was a wise counsellor who said that when looking at life we must "see it steadily and see it whole". If we endeavour to apply this advice when looking at psychiatric treatment our first impression is that of all its qualities wholeness is not the most obvious. Instead we find that psyche and soma have been divorced and that the "broken home" in psychiatry is as productive of maladjustment as it is in human life.

It is possible, however, to discern certain trends which promise to bring about a fertile reunion. One would expect to find that present trends in treatment reflect in some degree the known defects and limitations in existing methods, and this appears to be the case. Psychotherapy is criticized on several grounds, not the least being the confused state of the psychology on which it is based. In this respect it is distinguished from the physical methods of treatment which, for the most part, are quite unhampered by any hypothetical assumptions. Other criticisms of psychotherapy include the inflexibility of its theories and techniques, and the protracted nature of analytical methods.

The task of overcoming these unsatisfactory features is rendered all the more difficult because of the high incidence of psychogenic disorders and the relative shortage of psychiatrists with training in psychotherapeutic methods. In the brief time available it is not possible to deal fully with all the attempts which have been made recently to solve these problems. It may be more useful, therefore, to select a few which illustrate certain broad principles and which appear to offer most hope for future development: (*a*) Karen Horney's modifications of Freudian psychopathology, which offer the basis of a simpler theory and more practicable technique; (*b*) Roger's "non-directive therapy", which is based on a philosophy which is even more frankly that of an environmentalist; (*c*) Alexander and French's advocacy of a more flexible technique, in order to select the method to suit the patient, instead of the converse; (*d*) various forms of group therapy, the aim in most of which is social adjustment.

To appreciate the significance of the present trends of psychotherapy, it is desirable to relate them to the present trends in physical methods of treatment. Psychotherapy is not the only treatment of psychological disorders, nor are physical methods alone always sufficient; the methods are complementary. Psychosomatic medicine is perhaps the ultimate goal, but there is much to be done before we reach it.

Looking back on the progress of psychiatry resulting from the impetus given by two world wars, it is possible to note two major trends. The first, more apparent after 1939, was determined by the shortage of psychiatrists and the anticipated volume of neuro-psychiatric casualties. The search began for short cuts in therapy, especially for something briefer than orthodox psychoanalysis. Group therapy, which had been introduced before the 1939 war, offered a possible solution, and with wider application in subsequent years it proved its value.

Later in the course of the war the emphasis shifted towards prevention. In England the apparent increase in the rate of invaliding from the forces on account of psychiatric disabilities is seen, in retrospect, to have coincided with the preparations for the assault on Europe, and was evidently due not to increasing casualties, but to the deliberate elimination of unstable personalities who were "poor risks" under military stress. Misfits in the forces, they might prove useful workers in civilian life. A further step in this direction, on a more scientific level, was the development of personnel selection by an elaborate study of personality and of behaviour reactions in predetermined situations.

These two movements, one to treat the individual in relation to the group and not in isolation, and the other to assess personality in response to environmental demands, illustrate the trend in psychiatry towards a social orientation. The recognition of the significance of social and cultural factors in psychogenic disorders may have far-reaching effects not only on therapy, but also on the entire problem of mental health.

The neglect of this approach is seen at its worst in the old-fashioned type of mental hospital, where patients are herded together in such numbers and under such conditions that demoralization and "desocialization" are inevitable results. This deplorable state of affairs, not unknown in Australian mental hospitals from all accounts and according to outspoken articles in recent medical journals, is all the more tragic in view of the fact that where an enlightened policy of social adjustment has been applied the results have been most encouraging, even in cases of the so-called "chronic and incurable" conditions.

That physical methods of treatment, such as electroshock, insulin therapy and leucotomy, have been introduced is not a complete answer. In many cases, and especially when employed without the assistance of psychotherapeutic and socializing measures, they are only palliative. This is therefore one of the spheres in which the present trends in psychotherapy may be extended to great advantage.

Although it may be said that most physical methods are empirical, having little or no foundation in psychiatric theory, and indeed being often opposed on theoretical grounds, there is no doubt that the clinical results in certain cases are strikingly successful. If it is true that lack of theoretical knowledge does not necessarily prevent clinical success, it is equally true that an excess of doubtful hypotheses may seriously impede progress. This is one of the criticisms levelled against psychotherapy. An exaltation of theory and a belief in doctrine of debatable nature has earned the analytical therapist his title of "witch doctor" and "trick cyclist".

It is therefore of particular interest that from the ranks of the Freudian psychoanalysts there has arisen a voice of protest against preoccupation with psychological theory. Karen Horney suggests that by eliminating from Freudian psychology the debatable elements, and in particular the instinctivistic and genetic principles, it is possible to obtain not only a fuller understanding but also a more efficient treatment of the neuroses. If Horney's claims are substantiated in practice a valuable step towards shortening and simplifying treatment will have been taken.

According to Horney, "the relevant factor in the genesis of neurosis is neither the Œdipus complex nor any kind of infantile pleasure strivings, but all those adverse influences which make a child feel helpless and defenceless and which make him conceive the world as potentially menacing". The emphasis is on the effect of environment in relation to the developing personality. A good environment favours the development of a strong nucleus of personality, but unfavourable influences give rise to feelings of such helplessness that anxiety results. To protect himself against these dangers the child adopts certain safety devices which Horney names "neurotic trends". A particular type of character structure thus develops, which determines certain attitudes in human relationship. Neurosis is regarded, therefore, as a disturbance in human relationships, an alienation from self and others.

Three movements are described in which the individual endeavours to make relationship to others: (*a*) a movement towards others, in affection, trust and interdependence; (*b*) a movement against others, by standing up for one's own rights; (*c*) a movement away from others, to cultivate the self as a separate entity.

When adverse environmental factors give rise to neurotic trends these movements become exaggerated and compulsive. (*a*) Moving towards others becomes an intense need of love, protection and approval; a "compliant" type

[1] Read at a meeting of the Section of Neurology and Psychiatry, Australasian Medical Congress (British Medical Association), Sixth Session, Perth, August, 1948.

of personality results; the individual must always be approved, popular, indulged and privileged. (*b*) Moving against others becomes intense hostility, a need to excel and to gain control. An "aggressive" type of personality results; the individual callously overrides others, is ever wary of affection and is always alert to the weaknesses in others. (*c*) Moving away from others becomes an intense need of emotional isolation. A "detached" type of personality results; the individual is self-sufficient, independent and solitary.

The neurotic trends, being at once compulsive and at variance with one another, give rise to conflicts. The need of love is opposed to the need to dominate, and the need of isolation makes both affection and aggression impossible. Further elaborations are therefore required either to avoid awareness of the conflict or to create the illusion of unity and integrity. (*a*) Opposing trends may be repressed. The compliant character cannot show aggression; the aggressive character cannot yield. (*b*) Inner problems may be externalized. Difficulties are thus projected to employer, wife, friend *et cetera*. (*c*) An "idealized image" may be created. The individual endeavours to rise above his conflicts in phantasies of a superpersonality.

The drain on energy required to maintain these neurotic patterns leaves little available for the formation of relationships. The task of therapy is to enable the individual to appreciate his neurotic character structure and the protective devices which have been erected around the basic conflict. He is thus helped to become aware of his real feelings, he can see the crippling effect of his neurotic drives, and he is then able to experience the desire so to change that he may find inner freedom, happiness and growth.

Another challenge to the standardization of technique is seen in the work of Alexander and French, who advocate a much greater flexibility, suggesting, like Stekel, that psychotherapy is more of an art than a science. Contrary to the traditional belief that quick results cannot be genuine, they maintain that there is no simple correlation between therapeutic results and the length and intensity of treatment. Strategy and tactics, they say, are determined by two factors: the experience of the therapist and the functional efficiency of the patient's ego.

The skill of the therapist lies in his ability to plan the treatment according to the patient's personality and the actual problem he has to solve. As occasion arises the therapist may have to alter the frequency of interviews, to offer directions as to daily life, or to regulate the transference situation. He should explain the therapeutic procedure to the patient and indicate to him the part he must play. It is thus impossible for the therapist to play a passive role.

Two main forms of technique are described: (*a*) supportive, of which manipulation of the environment is the chief feature, no permanent change in the patient's ego being attempted; (*b*) uncovering, which resembles more closely the orthodox analysis and aims at a modification of personality to bring it into harmony with the demands of environment.

Supportive therapy is recommended for patients with acute conditions who were previously well adjusted but have broken down under exceptional stress, and for those with chronic conditions who have a constitutionally weak ego.

Uncovering or insight therapy is suitable for acute and chronic conditions provided that the patient has a strong ego, as shown by his ability to make good *rapport*, to endure intense sessions and to achieve insight. Good therapeutic results are claimed as the result of a satisfactory transference alone, without the development of a transference neurosis, but if the latter does develop the therapist can guide and control it.

In putting forward their case for a flexible technique Alexander and French emphasize also the importance of environmental factors, saying that the majority of mental disturbances are failures of adjustment to social living.

This very inadequate sketch of recent views may at least illustrate some practical efforts towards formulating an intelligible hypothesis as the basis of a simpler but equally efficient technique. Although there may not yet be sufficient data on which to judge the clinical value of such modified forms of treatment, the trend towards simplification is very apparent and seems to be a step in the right direction.

It is well recognized that all patients are not suitable for prolonged and deep analysis, and often it is sufficient to procure symptomatic relief enough to restore the patient to social efficiency. There would appear to be a place, therefore, for shorter and simpler techniques quite apart from the special indications for the more detailed and elaborate methods of psychoanalysis.

The "non-directive therapy" described by Rogers is an interesting illustration of this point. Rogers states that his method is derived from various sources, including psychoanalysis, but he makes little use of psychoanalytical theory. The technique consists of listening to the patient while he talks of his problems *et cetera*, without offering any comments of approval or disapproval, and without attempting any explanation or interpretation. Occasionally the therapist may make a remark to draw attention to a point of emotional significance or to clarify what has already been said by the patient, but throughout the interview the therapist's role is entirely non-committal and "non-directive". The essential feature is the definitely structured, permissive relationship.

If it is true that neurotic behaviour is the result of anxiety produced by a threatening environment, psychotherapy, to be effective, must offer a situation in which the patient can feel secure. Obviously he cannot feel secure in an environment which he regards as hostile or critical, or which sets out to change him. Any directive form of therapy, in which some would include the interpretations of psychoanalysis, threatens the neurotic with the very thing that he is afraid of—the menace of his environment. Another difficulty in making human relationship will be presented to him.

The first principle in non-directive therapy is therefore to offer the permissive (non-critical) relationship in which there is nothing to imply inferiority of the patient or any attempt to impose the views of the therapist on the patient. Free from threat and secure in a friendly environment, the patient is released from inhibiting anxiety. Fantasy is replaced by more realistic thinking; he begins to see things in a different manner, and this is followed by more positive action. One of the basic assumptions of non-directive therapy is that the individual possesses a drive towards growth, health and adjustment. An environment which presents a threat arouses anxiety and thus inhibits growth. The therapeutic environment in this technique is completely free from threat, that is, it is non-directive, and therefore growth and adjustment can take place.

Although this technique has not yet had sufficient application to prove its value in all forms of psychogenic disorder, it promises to be of value for minor maladjustments and has been successfully used in counselling university and college students. Having the merit of simplicity, brevity and perhaps safety, it meets most of the criticisms of psychoanalytical methods and appears worthy of further study and trial.

In these simpler forms of treatment there may be an element of danger. They may appear to offer to the non-medical psychologist an easy route to clinical practice. Whether psychiatrists approve or not, they must accept the fact that non-medical psychologists are giving close attention to the clinical application of psychology. This may be regarded indeed as one of the more important of present trends, because it involves not only certain dangers, but also certain possibilities towards future development. The dangers to both patient and therapist are too well known to require further comment; but what of the possible advantages?

With the increasing emphasis on social factors in the cause, treatment and prevention of psychogenic disorder, there is an increasing need to introduce workers in the social field. Psychiatry is immediately brought into closer

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association with social medicine and with sociology generally. Psychotherapy is therefore no longer a limited form of medical treatment, but involves a series of adjustments in human relationships, in the family, the school, the factory, and throughout the community. The cooperation of social workers and clinical psychologists with psychiatrists is essential if such work is to be carried out fully and efficiently. This is the basis of the psychiatric team, which should be the functioning unit in every clinic and hospital where psychiatric disorders are treated.

It is in the field of child guidance, however, that the work of the psychiatric team has been most developed, and especially with regard to group therapy. The introduction of group therapy was made first on the grounds of economy, by treating several patients at once and by simplifying technique. The details of technique vary according to the individual views of particular therapists, but most of them consist of a series of lectures and discussions, supplemented by a certain amount of individual work, with special attention to the main aspects of life, childhood, adolescence, marriage, work *et cetera*. In this way, as a fairly superficial form of therapy aiming only at social adjustment, it has been used for groups of psychotics in mental hospitals, but seldom on a scale which merits the title of group therapy. The best examples of its full application are seen in child guidance work among socially maladjusted children, for whom it is particularly useful. It is from this work that the following principles have been established.

The actual group, which is usually limited in number to six or eight, may be a natural or family group (consisting of parents and child, child and siblings *et cetera*) or a specially selected therapeutic group. The first and essential principle is that the group must be a carefully planned and organized body. Success stands or falls on the insight and skill used in grouping. The individual members must be chosen because of their potential therapeutic value to each other. Thus a frightened and withdrawn child will only be further traumatized if introduced into a group of aggressive tyrannical children.

Another important principle is that therapy should centre around some project or activity, such as puppetry, art, crafts or psychodramatics. Slavson, who has done much to advance this form of treatment, advises that the session should conclude with a meal, prepared, served and eaten by the group. In this way the group takes on the function of a substitute family.

No less important than the planning of the group is the choice of the therapist, whose personality must be suited to group work. Individual members of the group may project hostilities on to the therapist or may become dependent on him or may remain detached and indifferent. The therapist must endeavour to avoid activating any strong transference to himself and must remain neutral and adaptive, showing neither anxiety, disapproval nor irritation. In this way a secure and permissive group setting is maintained.

Group therapy may be employed with adults also, a useful point in view of the frequency of disturbed relationships towards parents and of actual maladjustment in parents in these cases. The same general principles apply, but in children it is desirable to precede group work by a period of individual therapy.

It is recognized that the ability to work with and to become a part of a group is an essential mark of a well-integrated personality. In the vast majority of psychogenic disorders there is a disturbance of interpersonal relationships, which interferes with group activity and thus gives rise to social maladjustment. It is therefore of particular significance that in psychotherapy there are definite trends towards the development of techniques which are relatively straightforward and reasonably brief, and which aim at the restoration of social adjustment and the formation of good relationships. At the same time there are signs that a similar outlook is being fostered in the more up-to-date mental hospitals. Finally, and most significant of all, is the rapid development of social medicine.

Is this not the common meeting ground where all forms of psychiatric treatment can come together and where they may find the greatest opportunity for a closer association with general medicine?

Mental hospital psychiatrists have for too long remained isolated in their institutions, losing opportunities for experience in the homes, schools and factories of the community, and thus out of touch with the very factors which play a major part in mental disorder. Psychotherapists, on the other hand, have been so preoccupied with theory that technique has suffered. Each has much to learn from the other, and the increasing attention now being given to psychosomatic medicine may encourage still closer union by removing the outworn concept of dichotomy of body and mind. There are now so many forms of treatment at our disposal—psychotherapeutic, physiochemical, surgical, social and occupational—that, given a properly organized and coordinated scheme of mental health and hygiene in the community, there is no longer any valid excuse either to neglect the early cases of maladjustment before actual breakdown or to allow the mental hospitals to remain as "monuments of dead stone and near-dead humanity".

The "new look" in psychiatry has a social and cultural pattern, and if present trends in treatment are to lead to any fruitful results, psychiatrists themselves must be prepared to shoulder their social responsibilities. One of these responsibilities is the education of the general public in the principles of mental health. There is ample evidence to show that propaganda of the right kind can do much to encourage reforms and to remove prejudice. This is well demonstrated by the work of Dr. Thomas Beaton, of Portsmouth, England, where by his efforts a fully organized mental health service has become an asset highly valued by the community. That psychiatrists have a duty to perform to the general public in the dissemination of knowledge is a point strongly made by Dr. W. Gordon Masefield in his presidential address to the Royal Medico-Psychological Association in 1947. The organization of public lectures, especially to groups of teachers, parents, clergy and adolescents, the extension of adult education to include child psychology, marriage guidance *et cetera*, and the establishment of social clubs and community centres for the benefit of family groups, are only a few of the many educational activities in which the modern mental health service and its psychiatrists should play a prominent part.

The problem of mental health is so closely bound up with the whole fabric of society and is so vitally connected with the industrial and social efficiency of the community that it is impossible to imagine any effective service which does not embrace fully the principles underlying present trends in treatment. In no other branch of medicine are preventive measures more necessary or more promising. In team work lies the secret of success, but the team must be extended to include mental hospitals, psychiatric clinics, child guidance clinics, public health, social medicine, schools and university, magistrates' courts and all aspects of social welfare.

Only thus may psychiatry "pioneer a service in which the pessimism of the past may give place to the idealism of the future".

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Reviews.

EVERYDAY PROBLEMS OF THE SCHOOL CHILD.

"EVERYDAY PROBLEMS OF THE SCHOOL CHILD", by Dr. Agatha Bowley, is an excellent survey of the successive stages of a child's school career.[1] It deals with the problems likely to arise in an ordinary school, and how they are related to a child's emotional life.

In her work in the Leicester School Psychological Service Dr. Bowley is constantly dealing with problems of school adjustment, so that her knowledge and experience combined with her warm human sympathy make her exceptionally well qualified to deal with these matters. To achieve happiness and satisfaction at school it is, of course, essential that children should be guided by teachers who have mature personalities and a real appreciation of the needs of their pupils. The study quoted, in which the motives of 643 students in a training college were examined to ascertain the factors governing their choice of career, gives food for thought. Studies undertaken on evacuated children during the war proved beyond all doubt the undesirability of separating the very young child from his mother for long periods. However, in some cases the mother is obliged for economic reasons to leave her baby or toddler at a day nursery. Dr. Bowley shows how some of the ill effects of this practice may be avoided.

The problems of the three or four year old are many, and it is shown how a good nursery school can supplement the home in assisting a child to work through his difficulties and can give him the best possible chance of happy social, emotional and intellectual development.

As far as children in the infant and junior schools are concerned, there is no doubt that problems would seldom arise if the methods of teaching advocated by Dr. Bowley could be more widely adopted. More money, better buildings, more teachers and smaller classes are essentials for the solution of many troubles with this age group. Some progress has been made in Australia in the provision of special classes for mentally retarded children, and the suggestions given for work with such children when they have reached adolescence should be of interest.

An appendix containing children's essays on "The Ideal School" is both revealing and amusing.

BIOPHYSICS.

H. C. WEBSTER AND D. F. ROBERTSON'S excellent book has one major fault which appears in both the full title and the first line of the preface. The full title is "Medical Physics for Medicine I".[2] The preface opens with "This book was written as a text book for first year medical students of the University of Queensland". Our opinion is that most first year medical students would not get much benefit from the book. Medical students who have not studied physics until they are in their first year at the university need a text-book which will present the elements of physics in an interesting way. This book deals with fundamentals briefly, in a manner suitable to students who have studied and enjoyed physics for several years at school. For these students the book should be useful. It should also prove valuable to senior medical students and graduates who have retained their interest in physics.

The authors write (page 1): "No one has as yet found any process in biological matter which is at variance with the great basic laws of science." This seems to conflict with the possession by animals of free will. The basic laws of science, as at present accepted, are definite and state that a certain effect will follow a certain cause. Sometimes the laws predict that one of two alternative effects will follow a certain cause, but the choice of the alternative is based on probability and not upon the wish of an animal.

The authors also write (page 54): "This surface tension has no real existence, but for some purposes it is convenient to give it a quantitative significance." With this statement we disagree, as will all people who have tried to remove a foreign body from the human eye. Forces do exist on the surface of liquids, and to say that they do not is not in accordance with the facts. It may be more convenient mathematically to treat by considering the surface energy per unit area instead of the force per unit length, but this does not mean that the latter force does not exist.

Although we have shown disagreement with some of the authors' statements, we commend them because they have not been afraid to express their own views. Many topics have been presented in novel ways, and it is this which makes the book so interesting. Many references are given and it is pleasing to note that most of them are of recent date. This should help readers to realize that biophysics is a rapidly growing science and that it is essential to read current literature in order to keep up to date. We can confidently recommend this book to all who are interested in biophysics.

CLINICAL ASPECTS OF THYREOTOXICOSIS.

ADVANCES in the treatment of a disease beget renewed interest in its diagnosis. "The Clinical Picture of Thyrotoxicosis", by Peter McEwan, caters for this interest in a field in which the last five years have seen much progress. The author has taken as his text Trousseau's statement: "If each of the principal symptoms be examined one by one, it will facilitate the diagnosis of this complaint"—and the hundred and twenty-seven pages of the book consist of a series of brief essays on each in turn of the facets of disordered thyreoid function. The thyreoid is regarded by embryologists as being probably the oldest of the ductless glands, and the wide influence which it wields throughout the body in both health and disease is not always appreciated. McEwan, who supports his contentions by quoting freely from case histories, takes some pains to demonstrate the protean manifestations of thyreotoxicosis, and discusses the way in which affections of the nervous, alimentary, urinary and other systems may be mimicked. The book is largely a record of personal experience and conclusions, and will probably be of greatest use to the general practitioner, on whom falls the chief burden of the recognition of thyreotoxicosis. There is a tendency for authors in all fields of medicine to produce books which consist mainly of a review of the literature (as a rule already reviewed elsewhere) with a sparse leavening of original work or personal opinion. While such compendia have their place, we welcome a book which presents chiefly the fruits of personal experience and deduction. Each of the symptoms is discussed from the practical rather than the theoretical viewpoint, and reference is made to some of the rarer types of thyreotoxicosis. Others, such as the myasthenic form, are not included. There is a brief consideration of the treatment of thyreotoxicosis, the author favouring surgical methods. The book is well set out and printed, but has only a few illustrations. McEwan concludes: "The pitfalls in the diagnosis of thyrotoxicosis are chiefly those of omission. It is the object of this book to make clear how, by a full knowledge of the symptomatology and a careful examination of the neck, these mistakes may be avoided. It has been said that these thyrotoxic cases are 'masked', but if the medical practitioner takes the trouble to make himself familiar with the clinical picture, the 'masks' disappear."

PROTEINS.

"PROTEINS AND LIFE" by M. V. Tracey is the first general book on proteins to be published in England.[3] The subject of proteins is a department of biochemistry which promises rapid development, and this book, within the limitations of its size, covers all points which would interest the reader desirous of obtaining an up-to-date survey of the field. The selection of the material has been influenced by Mr. Tracey's experiences as a biochemist at the Rothamsted Experimental Station. The subject matter is comprehensive, covering the problems of classification, analysis, structure, source of proteins, protein nutrition, and the functions of enzymes, nucleoproteins and hormones. The significance of all classes of body proteins is emphasized and the relationship of proteins to disease is discussed. An interesting chapter on the use of proteins in industry is included.

[1] "Everyday Problems of the School Child", by Agatha H. Bowley, Ph.D.; 1948. Edinburgh: E. and S. Livingstone, Limited. 7" × 4½", pp. 158, with illustrations. Price: 7s. 6d.

[2] "Medical Physics for Medicine I", by H. C. Webster, D.Sc., Ph.D., F.Inst.P., and D. F. Robertson, M.Sc., A.Inst.P.; 1948. Brisbane: University of Queensland. 9¾" × 6¼", pp. 324, with illustrations. Price: 54s.

[1] "The Clinical Picture of Thyrotoxicosis", by Peter McEwan, M.A., M.B., Ch.B., F.R.C.S. (Edinburgh); 1948. Edinburgh and London: Oliver and Boyd. London: Macmillan and Company, Limited. 8½" × 5", pp. 142, with illustrations. Price: 15s.

[2] "Proteins and Life", by M. V. Tracey, M.A. (Frontiers of Science Series. General Editor, Bernard Lovell, O.B.E., Ph.D., F.Inst.P.); 1948. London: The Pilot Press, Limited. 7½" × 5½", pp. 178, with illustrations. Price: 10s. 6d.

The Medical Journal of Australia

SATURDAY, MARCH 26, 1949.

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LOCAL ANÆSTHESIA.

It is many years since the subject of local anæsthesia (or analgesia, as it should properly be called) was discussed in the editorial pages of this journal. On that occasion—it was in December, 1935—it was stated that local anæsthesia was coming more and more into use. Further, it was stated that the time was coming when surgeons and anæsthetists would have to adopt it because patients would ask for it. Another reason why local anæsthesia would be more widely used in Australia in the future was declared to be the fact that the surgeon isolated from his fellow practitioners could by its means often carry out alone procedures which would otherwise be impossible—and we all know that there are many surgical operations which may have to be undertaken by an isolated practitioner to save a patient's life. It was pointed out that local anæsthesia has several advantages over other forms of anæsthesia. First of all, if spinal anæsthesia is excepted, it can be said that local anæsthesia is free from shock; secondly, it is safer than ordinary anæsthesia; and if used skilfully it is often more pleasant. It should not be necessary to state that if any comparison is to be made of the pleasantness of local as compared with inhalational anæsthesia it must be on a basis of administration in each instance by a skilled administrator. Since the object of the present discussion is to suggest that surgeons who are not familiar with local anæsthesia should become familiar with its use, if for no other reason than because they do not know when they may have to have recourse to it, it is important to state that it is not fair for a surgeon who has had years of success with ordinary anæsthesia to condemn local anæsthesia because in an isolated case, perhaps of some difficulty, he has not been satisfied with his experience. During the last few years a good deal of progress has been made in inhalational, or as we have chosen to call it, ordinary anæsthesia. New anæsthetic agents have come into use and adjuvant substances have found a fixed place in the anæsthetist's equipment. Though, as far as can be gathered, an increasing number of surgeons are using local anæsthesia, this increase has not been great. An opportunity to bring this subject to the notice of surgeons—surgeon specialists and those in general practice who are compelled to operate by reason of their geographical isolation or who choose to perform operations within their competence—has occurred by the publication of a book entitled: "A Surgeon's Guide to Local Anæsthesia: A Manual of Shockless Surgery".[1]

The author of this book, C. E. Corlette, has for many years been well known to readers of this and other journals as a surgeon who has used, and written about, local anæsthesia. On the subject of anæsthesia Corlette holds strong views and he expresses them in a forthright way; but his dogmatism is based on actual experience and his statements of that experience may be accepted as facts. In his introductory note he refers to his "opinion" and he states that though his system of premedication, for example, is safe, dependable and well proved, it is not perfect. One who writes in this way admits that others may have, and be entitled to, "opinions" based on experience. In the present instance it will be useful and, we think, for the good of surgery to ask what manner of book this is, what are its author's dominant views and how far it may be useful to Australian surgeons. In doing this we shall not be able to deal with the regional detail to which a great part of the book is devoted; actually the object of the present discussion makes such reference unnecessary. The first point about the book is that it is not addressed in the first place to physician anæsthetists and it is not written by one. It is a surgical book written by a surgeon for surgeons. The author states that except for the premedication, the technique of local anæsthesia is surgical and is part of the technique of the operation. The technique demands a surgeon's point of view, a good knowledge of surgical anatomy and a sufficient familiarity with general surgical technique. The author holds that unless this view is taken and adjustments are made in accordance with it, mishandling and inadequacy are bound to occur. Those who have seen local anæsthesia used by a skilled surgeon in extensive surgical procedures will agree with this.

At this stage it will be convenient to describe in a few words the medicaments used by our author. As an anæsthetic agent he uses ethocaine. This is one of the names given by the British Pharmacopœia to the drug elaborated by Einhorn and placed on the market in 1905 under the trade name of "Novocain". The strength of the solution used depends on the place and purpose of the injection. In operations below the clavicle he uses a 0·5% solution and he combines this with a one in 200,000 solution of adrenaline. The choice of anæsthetic agent is most important. As a matter of fact it would take a great deal of space to discuss the merits and demerits and the importance of the names of the different drugs. Corlette does this at some length and the untoward incidents that he mentions as having occurred in various circumstances are most instructive. The important point to be borne in mind is that once a drug has proved its worth in the hands of an operator, he should stick to that drug and make quite certain that when he uses it no mistake can be made, in either its identity or its strength, by anyone concerned in the operation or in the preparations for its performance. The adrenaline causes ischæmia—it is in

[1] "A Surgeon's Guide to Local Anæsthesia: A Manual of Shockless Surgery", by C. E. Corlette, M.D., Ch.M. (Sydney), F.R.A.C.S.; 1948. Bristol, John Wright and Sons, Limited. London: Simpkin Marshall (1941), Limited. Sydney: Angus and Robertson, Limited. 8½" × 5½", pp. 372, with 200 illustrations. Price: 35s.

effect "a physiological tourniquet"—and it has several effects: first of all it prolongs the duration of the anæsthesia; secondly, it increases the anæsthetic effect per unit of weight of the anæsthetic agent and so makes it possible to use smaller doses than would otherwise be necessary; thirdly, the relatively bloodless field caused by it facilitates the steps of the operation. Premedication is part of the technique for the production of local anæsthesia. Here Corlette prefers to use a combination of morphine and hyoscine. We need not follow him in the reasons he gives for his preference, nor need we refer to the doses of both drugs which he uses and which he sets out in a table according to the age and sex of the patient. The important point is that premedication is essential because it subdues fear and checks nervousness, and it also dims or blots out the memory of what happens. One practical statement made by Corlette is that local anæsthesia does not as a rule do away with touch sensibility; this touch sensation may be interpreted as pain and premedication will eliminate this possibility.

A question of the most practical importance is by whom the injections of the anæsthetic agent shall be given. In regard to the practitioner who has made himself proficient in local anæsthesia that he may use it in what may be called an isolated geographical emergency, this does not arise. The question has to be answered in respect of the surgeon who has determined to use local rather than general anæsthesia. In our reference to this subject in 1935 we suggested that the view that local anæsthesia was the province of the surgeon and not of the anæsthetist was not necessarily correct, that the surgeon had quite enough to do in performing the operation and that local anæsthesia might well be the care of the anæsthetist. Corlette writes that though the surgeon should himself be competent to do everything on occasion, he should not ordinarily be expected to carry the burden of inducing the anæsthesia. He explains that the surgeon has already enough to do. The surgeon should, he thinks, have anæsthetists for local anæsthesia, but he holds that in the new régime the anæsthetist will carry on as an assistant when the operation begins. If an anæsthetist is present as such at an operation which is being conducted under local anæsthesia, he will merely hold a watching brief in regard to the patient's general condition and he will pay particular attention to his circulatory and respiratory systems. He will also induce supplementary general anæsthesia on the rare occasions when it may be needed —the more skilled the surgeon is with local anæsthesia, the rarer will these occasions be. There is no reason why an anæsthetist, working constantly with a surgeon who uses local anæsthesia, should not become proficient as an assistant in local anæsthesia. The censorious would say that if he did, he would be an assistant surgeon and not an anæsthetist, and strictly speaking they would be right. We must remember that Corlette states at the outset that the technique of local anæsthesia is surgical and is part of the technique of the operation. The truth of this will be realized if a moment's consideration is given to the detailed knowledge of anatomy that is essential to the production of anæsthesia in the different parts of the body. It may be that in this aspect of the subject too much is made of words. What will happen in any given instance is that the surgeon who adopts local anæsthesia in his practice will make the arrangements that suit him best. Incidentally, the fact that a surgeon may have to accept a heavy burden in addition to his performance of a surgical operation is probably one of the chief reasons why local anæsthesia is not more widely used today. Be that as it may, we shall have to conclude that, whether he uses an assistant trained in local anæsthesia or not, the surgeon who prefers local to general anæsthesia must always be master of the situation—he must be a local anæsthesia expert. Even if he has a dozen skilled assistants with him, he can never unload from his own shoulders the responsibility for what happens to the patient while the operation is in progress.

The aspects of Corlette's book that have been discussed have been chosen in order to arouse interest in the use of local anæsthesia by general surgeons. But the whole subject has been covered in the volume and it is what the author claims it to be—a surgeon's guide. The author is careful to state that any surgeon starting out to use local anæsthesia must start at the beginning. In other words, no guide in the form of a book can take the place of experience, built up after trial and error and observation. As experience is gained shockless surgery will be achieved.

Current Comment.

THE CAROTID SINUS REFLEX IN CLINICAL MEDICINE.

ABOUT fifteen years ago considerable attention was focused on the symptoms which might occur in susceptible persons when the carotid sinus was mechanically stimulated. At this time the subject of fainting was of clinical interest, but the wider use of graphic methods of investigation of the heart and chemical and radiological techniques in intimate exploration of the circulation have turned our attention in other directions. Still, there is here an interesting little corner in knowledge concerning the regulation of the circulation. Weiss and his colleagues perhaps advanced studies on the carotid sinus more than other workers, although recollection of their writings may lay stress on the unusual aspects, such as the removal of nervous and other tissue from the region of the sinus for the relief of severe recurrent faints. Louis H. Sigler, who has written on this subject before, now presents the results of the examination of a series of patients, 750 males and 443 females.[1] Most of these were ambulatory patients who had a greater or less degree of cardiovascular disease, chiefly arteriosclerotic. Many of them had previously had one or more attacks of coronary occlusion. In accordance with the findings of Weiss, the test applied was performed on the patient in the sitting position, in which it was more sensitive; an exception was, of course, made with bedridden patients. With the head extended backwards, the carotid arteries were located at the level of the cricoid cartilage, and compression was gradually applied to one or other of them against the spinal processes. Caution is necessary in this manœuvre, as some people are extremely sensitive, and may suffer a profound reaction with only slight and brief pressure. The artery is compressed only on one side at a time for the same reason. If the heart slowed or was temporarily arrested the pressure was continued only till other symptoms appeared, and as a rule in a susceptible individual this took place within fifteen seconds. The same applied to the occurrence of a vasodepressor reflex. If no signs of cardiac slowing or arrest or of vasodepression appeared, the pressure was continued until all possible subjective symptoms had been elicited, or until it was apparent that the patient was not susceptible. Some sensitive patients produced a reaction in four seconds, but as a rule com-

[1] *Annals of Internal Medicine*, October, 1948.

pression of one or other carotid artery for fifteen seconds was needed to elicit a response if it could be obtained at all. The author found that 970 of the 1193 patients, that is, 81%, gave a response. Such a response might be purely subjective, or objective, in addition to depression of the circulation with or without slowing of the heart. Sometimes pressure on one sinus would produce symptoms, but not pressure on the other, and the symptoms elicited by pressure on one side were not always the same as those obtained on the other. Sigler lists the signs and symptoms he has found in these tests. It is an extraordinarily varied collection, including cerebral, ocular, vasomotor, respiratory, somatic, constitutional and gastro-intestinal disturbances. In addition, palpitation and pain were sometimes observed, as well as the other circulatory phenomena. Patients in whom cardiac stoppage or substantial fall in blood pressure was caused sometimes gave rise to alarm, but no untoward results followed. A direct cerebral effect seemed to be the commonest finding, and this varied from dizziness to coma or convulsions. When the heart was much slowed loss of consciousness, if it occurred, took place after the heart had resumed a more rapid rate, indicating that the manifestations were due to a reflex effect on the brain, either in its vascular arrangements or in the neuronal synapses. In order of frequency the subjective disturbances recorded in this series were as follows: dizziness, unconsciousness, convulsions, ocular sensations and abnormal sensations referred to the vasomotor system, the sweat glands, other sense organs, the gastro-intestinal system and the heart. It is of interest to know if the patients found susceptible to these tests had been subject to previous spontaneous attacks of the same nature. This was found to be so in a limited number of cases, but some of those who claimed to have had such attacks did not reproduce them on test. As previous investigators have found, Sigler observed a few sensitive patients who could reproduce these reflex disturbances by irritation in the region of the carotid sinus, or even by bending the head. Sigler concludes that the part of the nervous arc responsible for these manifestations is not the receptors of the carotid sinus, but the central or efferent components, and that therefore surgical removal of the nervous connexions of the carotid sinus region cannot be expected to give relief. He emphasizes too the possible risk of applying this test to people with cerebral arteriosclerosis, in whom dangerous reactions may arise. It is worth while to ponder again the possible significance of very diverse symptoms in cardio-vascular disease, and to realize that in spite of all the mechanical aids available for modern investigation, clinical insight into the individual problems of every patient calls for understanding and analysis by his doctor.

ADVANCES IN THE TREATMENT OF SPRUE.

SPRUE was once regarded in non-tropical countries as a sort of curiosity, but the greater interest taken in macrocytic anæmias and the advances in their treatment have helped to alter so restricted a view.[1] Besides, the recent war has brought the tropics to our door, and modern transport has made us think in terms of time rather than of mileage. The non-tropical forms of steatorrhœa are also recognized to be much less rare than was once thought, thanks to the resource of the pathologist and biochemist. L. P. R. Fourman, G. Higgins, P. Quelch, J. R. P. O'Brien and L. J. Witts[1] have examined the methods of investigation of patients with steatorrhœa, pointing out that these routines are now called for in the study of such patients, even those with mild and recovering conditions of faulty fat excretion and absorption, and those with obscure anæmias. Their method involves the use of a twelve-day balance period, divided into three equal parts, distinguished by markers of carmine. They compared the value of four-day and twelve-day periods both on patients with steatorrhœa and on controls. It would obviously be an advantage if the shorter period was sufficiently reliable. They conclude that balance studies of this kind need a period of twelve days for accurate work, as fat excretion varies to an extent of 30% over four-day periods on a standard diet. However, the four-day test period is usually adequate for the diagnosis of steatorrhœa, though the writers find that study of the effect of treatment requires the longer experiment. Investigation of patients who had been treated with folic acid as well as liver and yeast showed that almost normal fat absorption was attained in a case of tropical sprue, but no change was found in two patients with idiopathic steatorrhœa, even after several months of similar treatment. This result might be expected, but it is now interesting to compare the results of treatment with agents even newer than folic acid. Vitamin B_{12} is the name given to a chemical substance recently isolated and tried experimentally in small quantities. It is one of the growth factors for *Lactobacillus lactis* and is said to be much more potent per unit weight than liver extract or folic acid. T. D. Spies and R. M. Suarez[1] report the results of an investigation so far limited by the small amounts of this substance available. Previous trials have been made in pernicious anæmia, macrocytic anæmia of nutritional origin, and sprue. The present report deals with the use of this concentrate on five patients with sprue in Puerto Rico. Rigid criteria were adopted in selecting the patients, who had to conform to the following conditions. The bone marrow showed changes typical of megaloblastic maturation arrest seen in macrocytic anæmia of nutritional origin, and the blood showed changes accepted as characteristic of this macrocytic type; the patients were untreated or at least not treated recently, had low reticulocyte counts, and had alimentary symptoms consistent with a diagnosis of tropical sprue. All the hæmatological methods used were standardized, as was also all apparatus used. The response to the treatment was striking provided the dosage was adequate. A dose of four microgrammes was apparently insufficient, but 10 to 25 microgrammes produced a good response. With the limited experience gained in so small a series it seemed as if the simultaneous administration of liver enhanced the response. It was thought that a single injection of 100 microgrammes would probably be needed to produce a full hæmatological response in a patient severely ill with sprue. The chief interest in this work lies in the extremely small amount of a chemical fraction of liver extract required to alleviate the disease. The authors think that it is more powerful per unit weight than any other therapeutic substance.

Another report has been published by G. G. Lopez, F. Milanes, R. L. Toca, T. Aramburu and T. D. Spies setting forth the results of using synthetic 5-methyluracil, known as thymine.[2] This substance has been known for about two years, and its effect in exciting a remission of macrocytic anæmia parallels that produced by folic acid. Here, however, the dose is not a fraction of that of other preparations, but much greater. A dose several thousand times that of folic acid is required. Thymine shares with folic acid also its ineffectiveness in subacute combined degeneration of the cord. Three patients with sprue were investigated in this series. Even more rigid criteria were adopted for the diagnosis of sprue than in the previous observation. After the necessary studies the patients were placed on a dose of fifteen grammes of synthetic thymine daily, given in two doses suspended in water. An excellent and prompt response was obtained, and after the patients were discharged from hospital they were instructed to take a full diet with necessary supplements, and the same dosage was maintained. A follow-up of these patients after a year showed that they had kept in good health and that the sprue was controlled. The authors do not recommend the drug as a maintenance treatment for sprue, owing to the enormous dose; folic acid is evidently much more practical and useful. But these examples of progress in knowledge give hope that the treatment of nutritional disease of this kind may be much simpler in the future. At present it looks as if therapy is becoming more specific in many diseases, and more easy to carry out, but the measures necessary to investigate the condition in the beginning, and to control it after it has been found to respond, are becoming more complex, and, incidentally, more expensive.

[1] *Clinical Science*, Volume VII, Number 2, 1948.

[1] *Blood*, November, 1948.
[2] *The American Journal of the Medical Sciences*, September, 1948.

Abstracts from Medical Literature.

BACTERIOLOGY AND IMMUNOLOGY.

Vaccination against Influenza in 1947.

G. G. LOOSLI, J. SCHOENBERGER AND GWENDOLYN BARNETT (*The Journal of Laboratory and Clinical Medicine*, July, 1948) have assessed the results of vaccination against influenza during the epidemic of 1947. The study was carried out in the Student Health Service of the University of Chicago, two thousand students being observed. A vaccine composed of both A and B strains was injected subcutaneously, and paired samples of serum were tested to provide evidence of increase in antibody titre two to three weeks after vaccination. Three months later an epidemic of acute respiratory disease broke out amongst the students, and throat washings from some of the patients yielded influenza virus, two different strains being isolated. Paired samples of serum from patients tested for antibodies to the new strains showed greater response to these than to the strains present in the vaccine. No difference in incidences of disease was observed between the vaccinated and the control group. The authors suggest that the evidence available indicates that there were considerable antigenic differences between the epidemic strain and the immunizing strains, and that this was the determining factor in the failure of usefulness of the vaccine. They think that development of a vaccine of broad antigenic coverage should be sought, as well as one capable of inducing an adequate antibody response.

Fever Caused by Bacterial Pyrogens.

IVAN L. BENNETT (*The Journal of Experimental Medicine*, September, 1948) began observations on the fever caused by bacterial pyrogens with a study of the relationship between the fever caused by bacterial pyrogens and the fever accompanying acute infections. Comparisons were made between fever induced in rabbits by killed typhoid bacilli or killed coliform bacilli, and fever induced by infection with pneumococcus type I or *Bacterium coli*. It was found that daily injections of the pyrogens into rabbits induced a tolerance to the substance which faded out three weeks after cessation of the injections, while intravenous injection of similar pyrogens into animals recovered from infection with *Bacterium coli* or pneumococcus did not reveal any tolerance towards them. This suggests that the mechanism of recovery in these infections is not dependent on tolerance towards pyrogens of bacterial origin. The author concluded that the mechanisms of fever in many different bacterial diseases were likely to be dependent upon some common factor, perhaps a product of cell injury, rather than on any substance directly associated with the infecting organism. He continued his observations with a study of the relationship between the fevers caused by bacterial pyrogens and those caused by the intravenous injection of the sterile exudates of acute inflammation. This was an attempt to repeat Menkin's work on pyrexin, with particular precautions taken to establish the absence of bacterial pyrogens as a contamination in inflammatory exudate produced by the intrapleural inoculation of turpentine into dogs. This procedure resulted in the production of an acid fluid containing mononuclear cells, sterile on incubation, which frequently, though not always, stimulated a febrile response in rabbits, which differed in height and time relationship from that produced by typhoid vaccine. Repeated doses of the exudate into rabbits over a period of 21 days did not produce any evidence of tolerance to the fever-promoting property of the exudate. Animals in which tolerance to typhoid vaccine had been produced previously were then subjected to a course of injections of exudate, and then a test injection of vaccine was made; the response was marked, showing that the exudate could not maintain tolerance to the bacterial pyrogens. It was concluded that the fever-promoting property of sterile exudates is not due to the presence of bacterial pyrogen.

Biochemical Reactions of the Proteus Group.

G. T. COOK (*The Journal of Pathology and Bacteriology*, April, 1948) has studied urease and other biochemical reactions of the Proteus group. The investigation developed following the increasing isolation of Proteus organisms from enrichment cultures of fæces, with consequent waste of time in the search for intestinal pathogens. It was observed that a buffered agar medium containing a trace of glucose and 2% of urea, with phenol red as an indicator, would show a deep red colour within three hours of inoculation of a strain of Proteus onto the surface, due to the splitting of the urea and the formation of ammonia. The test was applied to routine cultures of fæces and 120 Proteus strains were identified; all yielded a red colour on this medium. The author considered that a routine use of the medium would aid considerably in the rapid identification of intestinal pathogens.

Means of Increasing the Tuberculostatic Effect of Chemotherapeutic Agents.

B. EISEMAN (*The Journal of Experimental Medicine*, August, 1948) states that certain surface-active agents used by Dubos and his co-workers have stimulated the growth of mycobacteria. He postulated that a means of enhancing the effect of known chemotherapeutic agents would be obtained by concentrating an inhibitory instead of a stimulating substance at the surface of the organisms. Compounds were therefore synthesized in which the oleate radical, which attaches the surface active compound to the bacterium, was combined with a nucleus of known tuberculostatic properties. A series of fourteen different substances was produced, and tested against mycobacteria of human and animal origin as well as saprophytes. The minimum concentration at which they inhibited the growth of human tubercle bacilli grown in a modified Proskauer-Beck medium was in all instances considerably lower than that of "Promin", which was used as the control drug of known tuberculostatic activity, not being surface-active. When "Tween 80", a surface-active agent possessing growth-stimulating properties, was added to the medium, the tuberculostatic properties of the compounds being tested was decreased 100 to 500 times. The author discusses the physicochemical concentration and orientation of a drug in relation to its bacteriostatic action, and anticipates that the incorporation of the molecule into a surface active compound might increase considerably the tuberculostatic effect of such drugs as streptomycin.

Antibodies in Syphilitic Patients.

THOMAS B. TURNER, F. C. KLUTH, CHARLOTTE MCLEOD AND CHARLES P. WINSOR (*The American Journal of Hygiene*, September, 1948) have studied protective antibodies in the serum of syphilitic patients. This study followed the demonstration of the power of serum from syphilitic rabbits, when mixed with virulent treponemata and injected into normals, to suppress or modify the development of syphilitic lesions. Specimens of serum were obtained from 338 syphilitic patients and 107 non-syphilitic subjects as controls. These specimens were mixed with inocula proven to contain an infective dose of organisms and free from gross bacterial contamination, and the mixtures were injected into groups of rabbits. In a proportion of animals there was complete inhibition of lesions and they survived intact to the end of the observation period, while in others lesions developed after a greatly prolonged incubation period and were of smaller size. In the specimens of serum from syphilitic patients under treatment, there appeared to be no correlation between the serological titre and the degree of inhibition of the lesions. The authors concluded that the protective antibodies played a significant role in the immunity to disease, but they could not determine their relationship to the antibodies to beef heart antigen, though indications suggested that the two were not identical.

Quantitative Antistreptokinase Studies in Patients Infected with Group A Hæmolytic Streptococci.

HAROLD C. ANDERSON, HENRY G. KUNKEL AND MACLYN MCCARTY (*The Journal of Clinical Investigation*, July, 1948) have made quantitative antistreptokinase studies in patients infected with group A hæmolytic streptococci, and a comparison with serum antistreptolysin and γ globulin levels, with special reference to the occurrence of rheumatic fever. The tests were carried out according to the method of Tillett and Gardner with a single batch of culture filtrate or streptokinase and a single batch of human plasma as substrate. The object of the investigation was to determine whether significant differences could be found between patients who subsequently developed rheumatic fever and those who did not. There were several groups of patients, one with a single type of streptococcus, one whose members had more than one type, a group the members of which were treated successfully with penicillin and in which only the first culture yielded hæmolytic streptococci, a group in which this treatment failed, and a group of 23 patients who subsequently developed rheumatic fever. Penicillin treatment prevented the development of antistreptolysin, though the total antibody response of serum

globulin was not affected. In the presence of more than one type of streptococcus the general levels were higher than with a single type. The patients who developed rheumatism showed a consistently higher general level of antibody response than those who did not, but there was no outstanding difference in the results of the different tests.

HYGIENE.

Skin Lesions in Persons Exposed to Beryllium Compounds.

R. GRIER, P. NASH AND D. FREIMAN (*The Journal of Industrial Hygiene and Toxicology*, July, 1948) describe three cases of subcutaneous granuloma arising in persons who had cut themselves on broken fluorescent lamps coated with beryllium containing phosphor. The pathology of these lesions is similar to that seen in the skin lesions of two beryllium workers who had pulmonary granulomatosis, and essentially similar to the lung lesions seen in this disease. The authors state that treatment should involve complete excision of the original cut and that caution should be exercised in the disposal and salvage of burnt-out fluorescent lamps.

A New Approach to the Training of Food Handlers.

J. L. ROWLAND AND J. H. FRITZ (*American Journal of Public Health and The Nation's Health*, November, 1948) discuss a new approach to the training of food handlers. They state that the National Sanitation Foundation found the intelligence quotient of the average food handler to be between the fifth and eighth grades. The authors recommend the repetition of a few salient facts in regard to food handling assisted by the use of coloured slides. They suggest that training should be divided into the following five sections: (i) the provision of material which can be controlled for speed of presentation according to the need of the particular group of food handlers; (ii) the imparting of a working knowledge only of bacteriology; (iii) discussion separately with each group engaged on the same specific duties, for example, managers, cooks, bartenders *et cetera*; (iv) the stressing of only those items that are commonly found in violation so as to get a greater retention; (v) the creation of a course of talks that is easily adapted to the group being addressed. The authors consider that the public must also be taught to demand food which has been hygienically handled.

The Sanitary Significance of Cocci in Swimming Pools.

C. RITTER AND E. LEE TREECE (*American Journal of Public Health and The Nation's Health*, November, 1948) have investigated the significance of cocci in swimming pools. They state that it has been thought that the routine test for the coliform group of organisms is not an adequate index of safety and that consideration should be given to contamination of swimming pools with organisms from the skin and the respiratory tract. The presence of cocci would give evidence of such contamination. However, during these investigations, no streptococci of the β hæmolytic type were isolated, and the low resistance of this group to free chlorine was demonstrated. In 179 analyses from 92 swimming pools, other streptococci were recovered 83 times and coliform organisms were recovered 32 times. Pools with recirculation and continuous chlorination of water were found to have a better quality of water than those of the fill-and-draw type. In the opinion of these investigators, the routine coliform test is an adequate index of the safety of the water in swimming pools.

Environmental Studies in Plants and Laboratories Using Beryllium.

M. EISENBUD, C. BERGHOUT AND L. STEADMAN (*The Journal of Industrial Hygiene and Toxicology*, September, 1948) have investigated the concentration of beryllium compounds in the atmosphere in factories where acute respiratory conditions due to the inhalation of beryllium compounds had occurred. Several hundred air samples were collected. Beryllium compounds shown to cause acute pneumonitis were the sulphate, fluoride and oxide, as well as the metallic beryllium dust. Beryllium did not cause acute toxicity. Many acute cases have resulted from a single excessive exposure. In the case of the fluoride, an exposure of twenty minutes' duration produced three cases of acute pneumonitis.

Mortality from Diarrhœal Disease in the United States.

F. M. HEMPHILL (*Public Health Reports*, December 31, 1948) states that trends of mortality in the United States from those causes of diarrhœal diseases studied have been downward for the period 1933 to 1946 inclusive. The decrements during this period have been spasmodic rather than regular. The most significant annual decrement during the period came in 1946, this being primarily in the summer and autumn months. The winter-spring level remained constant during the period 1941 to 1946 inclusive. Children under the age of two years who died from the causes studied were most frequently from rural areas; the large majority were under the age of one year. The author states that, of the factors which were considered, those to which the decrease of 1946 can be most satisfactorily attributed are improved medical treatment and the widespread use of DDT.

The Los Angeles "Smog" Problem.

H. F. JOHNSTONE (*The Journal of Industrial Hygiene and Toxicology*, November, 1948) discusses technical aspects of the situation that has arisen in recent years in the Los Angeles area resulting from the increased atmospheric pollution, commonly referred to as the "smog" problem. He points out that public sentiment and improved standards of living demand that excessive pollution of the atmosphere be prohibited in areas of dense population. The problem in Los Angeles results from the topographical and meteorological features of the area which control the escape of the industrial and domestic pollution. Elimination of the nuisance will require more rigorous standards than those in other cities where the wind and normal atmospheric turbulence rapidly diffuse the contaminants. The author states that exact information on the nature of the smog is still lacking, but certain aspects of the problem are related to the general properties of aerosols. It is estimated that the non-hygroscopic, non-volatile particles are approximately the size of the wave-length of light and exist at concentrations of about 0·1 milligramme per cubic metre. The contribution of sulphur compounds to the smog and to eye irritation is discussed and methods of eliminating them from industrial gases are reviewed. New developments in the equipment for the control of dust and fumes are described. The author considers that these and other methods of control of industrial contamination give promise of success in alleviating the condition.

Effects of "Agenized" Flour on Man.

A. ELITHORN, D. M. JOHNSON AND M. A. CROSSKEY (*The Lancet*, January 22, 1949) describe an investigation in which children from whose diet "agenized" flour had been excluded were compared with children receiving flour "agenized" at the current commercial rate. After eight months no changes were detected. Then those children from whose diet "agenized" flour had been excluded were fed on a diet prepared from a flour with an "agene" content higher than that used for the other group. Immediately after the change most of the children did not maintain their normal weight increase, but their performace in psychomotor tests was better. The authors state that the changes did not reach a level of statistical significance and their relation to the change of diet is not clear. Two adult volunteers lived for eight weeks on a diet containing heavily "agenized" flour without apparent physiological or psychological ill-effects. The authors conclude that the effects of commercially "agenized" flour are difficult to detect; it may be harmful, beneficial or inactive.

Conditions in Brickworks.

G. F. KEATINGE AND N. M. POTTER (*British Journal of Industrial Medicine*, January, 1949) describe modern brickmaking methods and report environmental studies carried out in a brickworks employing sixty-five workers. These studies included a survey of atmospheric conditions, the dust hazards, the risk from exposure to fumes and an investigation into the nature of the mineral oil in use. The authors found that the dust hazard was not excessive; chemical analysis indicated that the material consists mainly of combined silica and alumina. Traces of sulphur dioxide and hydrogen sulphide were found. The carcinogenic properties of the mineral oil in use appeared to be low. Two cases of keratotic changes in the skin occurred in workers exposed to the oil. The general health of the workers was good. Seventy-three men had chest X-ray examinations; "dust changes" in the lungs were noted in two cases. The number of accidents causing injury was very low. The authors state that brickmaking does not involve excessive occupational hazards, but it requires considerable physical effort, and exposure to extremes of temperature is frequent. Placement examination is essential to exclude those physically unfit for the work. Periodic medical examination of certain workers is needed.

Medical Practice.

THE NOMENCLATURE OF BLOOD CELLS.

THE following is a condensation of the first and second reports of the Committee for Clarification of the Nomenclature of Cells and Diseases of the Blood and Blood-Forming Organs, a committee which is sponsored by the American Society of Clinical Pathologists and has the endorsements of the American Medical Association and the International Society of Hematology. This condensation is reproduced by permission of the American Society of Clinical Pathologists. The original reports were published in the *American Journal of Clinical Pathology*.

THE TERMS AND DEFINITIONS FOR THE CELLS OF THE LEUKOCYTIC, THROMBOCYTIC AND ERYTHROCYTIC SERIES.

Clarification and definition of terms is urgently needed for the sake of a common understanding in clinical usage and in teaching of medical students and technicians. The choice of a preferred term, it was agreed, should not be based merely on historical priority or common usage, but, in general, should represent the simplest, clearest and most descriptive term. Eponyms and new terms should be avoided wherever possible, without sacrifice of clarity. An effort should be made to attain consistency between related terms.

The various series of cells were considered. It was recommended that in Table I the term listed at the left replace all terms listed at the right in referring to cells of a particular series or to a disease affecting any cell of that series.

No changes were suggested in the criteria in current use for determining the series to which a cell belongs. It is hoped, however, that the advances now being made in histochemistry will contribute more clearcut criteria than are available at present.

It is recommended that the term *leukocyte* be considered synonymous with white blood corpuscle and include all white cells of the blood and their precursors in the blood-forming organs. Its use should not be limited to cells of the granulocytic series, excluding cells of the lymphocytic, monocytic or plasmocytic series. This and other words derived from the same root should be spelled with a *k* and not a *c*, *e.g.*, leukocyte, leukemia, not leucocyte or leucemia.

It is recommended that the descriptive terms for granules, *neutrophil, eosinophil, basophil,* and *azurophil* be spelled as indicated without a final *e*.

It is suggested that the name of the most undifferentiated of the cells of each series carry the suffix *-blast,* the second stage the prefix *pro-* and, except in the granulocytic series, all cells that are more mature than the -blast stage have names with the suffix *-cite*. The name for the fourth stage in the granulocytic and erythrocytic series is to have the prefix *meta-*. The terms *blast cells* and *pro cells* may be used to replace other terms for these stages of development when speaking of the stage of development as a whole or when the series to which the cells belong has not been identified.

It is recognized that the *blast cells* of each series are morphologically very similar, all having fine nuclear chromatin structure, usually demonstrable nucleoli, and basophilic cytoplasm, with or without azurophilic granules, so the prefix to be used will, in many instances, depend on the identification of the *pro-* stage associated with them.

Fine chromatin structure is defined as having the nuclear appearance of a background of homogeneous lighter-staining parachromatin, overlaid by a darker-staining lace-net meshwork or finely stippled pattern of basichromatin, with no aggregation of the basichromatin into even a single clump of appreciable size staining darker than any other areas in the nucleus.

A *nucleolus* is defined as a homogeneous blue-staining area within the nucleus of a cell, which stains more like the cytoplasm than does any other part of the nucleus.

The term *azurophil* should be applied to the granules seen typically in the cytoplasm of cells of the lymphocytic and monocytic series and the progranulocyte stage of the granulocytic series. The term *azurophil* is recommended, and not *azure*, in describing these granules, since the term refers to an affinity for a particular dye and not to the color of the granules. These granules may be present or absent in any cell of the lymphocytic series and when present are usually coarse and in clumps. They are usually present in all cells of the monocytic series, including the monoblast. In the monocytic series they are usually fine, diffusely and uniformly scattered through the cytoplasm. If not seen in the monocyte or promonocyte, it usually indicates a faulty stain or poor visual definition in the microscope. These granules may be present or absent in any cell of the granulocytic series. They are rarely seen beyond the myelocyte stage except in disease. They are occasionally present in the cytoplasm of cells of the plasmocytic and erythrocytic series, and constantly present in the cells beyond the blast stage in the thrombocytic series where they tend to be fine and few in the early stages and numerous and often clumped in the more mature stages.

It is recognized that in each cell series there is a continuous development from the most undifferentiated to the most differentiated stage, that an infinite number of subdivisions are possible, and that any subdivision is arbitrary. The committee recommended the use of the minimum number of subdivisions which will provide essential information for diagnostic and prognostic purposes and defined the lines of division between these stages as clearly as possible, basing these divisions on a single easily identifiable feature. As far as possible, the feature selected to differentiate the different stages of development is one which could be recognized in either stained or supravital preparations, but it is realized that at present the majority of such decisions will be based on smears stained with Wright's stain or with one of the other Romanowsky stains. Even with these definitions, cells will be encountered where decision is difficult, in which case it is suggested that the cell be arbitrarily placed in the more differentiated category.

TABLE I.

Recommended Terms and Terms to be Avoided when Referring to Cells of a Particular Series or to a Disease Affecting any Cell of that Series.

Term to be Used.	Terms to be Avoided.
Lymphocytic ..	Lymphoid, lymphatic, lymphogenous, lymphocyte, mononuclear.
Granulocytic ..	Myeloid, myelogenous, myelocyte, myelocytic, granulocyte, leukocyte, leukocytic, leucocyte, leucocytic.
Monocytic	Monocytoid, monocytogenous, mononuclear, monocyte.
Plasmocytic ..	Plasma cellular, plasmacytogenous, myeloma cell, plasmocyte.
Thrombocytic ..	Megakaryocytic, platelet, thrombocyte.
Erythrocytic ..	Erythroid, erythrocytoid, erythron, erythrocytogenous, erythrocyte.

Names were selected for each of the cells, which were acceptable to all members present and which, in the opinion of the committee, were least likely to be confusing.

The recommended terms and the terms to be avoided are listed in Table II.

It is not the intention of the committee to imply from its recommendation of terms to be used that the origin of all these cells has been settled.

It is recognized that to ensure flexibility and for certain specialized purposes finer subdivisions may be necessary than those herein recommended. It is suggested that in such case no change be made in the term or definition of the recommended major divisions, but that *clearly defined* qualifying adjectives be used for these further subdivisions. Should new knowledge indicate that another major cell division is needed the evidence for this need, together with the suggested term, should be submitted for consideration by a permanent body which it is hoped will develop out of this committee.

The definitions decided on are as follows:

Lymphoblast: Any cell of the lymphocytic series having fine chromatin structure in the nucleus. Cells of blast morphology associated with prolymphocytes should be tentatively classified as lymphoblasts.

Prolymphocyte: Any cell of the lymphocytic series intermediate in morphology between the lymphoblast and the lymphocyte. It will always have too coarse a chromatin structure to fit the criteria for a blast and too fine a chromatin structure or too large a cell diameter to be classed as a lymphocyte. Usually, but not always, prolymphocytes are larger than 15 microns in diameter, which is the upper limit for the lymphocyte.

Lymphocyte: Any cell of the lymphocyte series having the morphology of those commonly found in the blood of healthy adults.

Monoblast: Any cell of the monocytic series having fine chromatin structure. Usually nucleoli are visible. Cells of blast morphology found in association with promonocytes should be tentatively classed as monoblasts.

Promonocyte: Any cell intermediate in morphology between the monoblast and the monocyte. It is differentiated from the monoblast by having an irregularly shaped nucleus and somewhat coarser chromatin structure, and from the monocyte by the presence of one or more nucleoli.

Monocyte: Any cell of the monocytic series having the morphology of those commonly found in the blood of healthy adults. It is differentiated from the promonocyte by the absence of nucleoli.

TABLE II.

Recommended Terms and Terms to be Avoided when Referring to Specific Cells of the Blood and Blood-forming Organs.

Name of Series.	Term to be Used.	Terms to be Avoided.
Lymphocytic.	Lymphoblast.	Myeloblast, hemocytoblast, lymphoidocyte, stem cell, lymphocyte.
	Prolymphocyte.	Large lymphocyte, pathologic large lymphocyte, atypical leukocytoid lymphocyte, monocyte, immature lymphocyte.
	Lymphocyte.	Small, medium or large lymphocyte, normal lymphocyte, small, medium or large mononuclear.
Monocytic.	Monoblast.	Myeloblast, hemocytoblast, lymphoidocyte, lymphocyte, stem cell, immature monocyte.
	Promonocyte.	Premonocyte, hemohistioblast, immature monocyte, Ferrata cell.
	Monocyte.	Large mononuclear, transitional, clasmatocyte, endothelial leukocyte, histiocyte, resting wandering cell.
Granulocytic.	Myeloblast.	Granuloblast, hemocytoblast, lymphoidocyte, lymphocyte, stem cell.
	Progranulocyte.	Promyelocyte II, leukoblast, myeloblast, premyelocyte, promyelocyte, progranulocyte A.
	Myelocyte.	Granulocyte, myelocyte B, non-filament, class I.
	Metamyelocyte.	Metagranulocyte, juvenile, myelocyte C, non-filament, class 1.
	Band cell.	Staff cell, stab cell, non-filament, class I, rod nuclear, polymorphonuclear, stab-kernige, rhabdocyte, non-segmented.
	Segmented.	Polymorphonuclear, filamented, class II, III, IV, or V, lobocyte.
Plasmocytic.	Plasmoblast.	Myeloblast, hemocytoblast, lymphoidocyte, lymphocyte, stem cell, lymphoblastic plasma cell, myeloma cell.
	Proplasmocyte.	Türk cell, Türk irritation form, lymphoblastic or myeloblastic plasma cell, myeloma cell.
	Plasmocyte.	Plasma cell, Unna's plasma cell, Marschalko's plasma cell, plasmacytoid lymphocyte, myeloma cell.
Thrombocytic.	Megakaryoblast.	Megalokaryoblast.
	Promegakaryocyte.	Premegalokaryocyte.
	Megakaryocyte.	Megalokaryocyte.
	Thrombocyte.	Platelet, thromboplastid.
	Disintegrated cell.	Senile cell, smudge, basket cell, smear cell, degenerated cell.

Myeloblast: Any cell of the granulocytic series having fine chromatin structure and containing no specific granules. Usually nucleoli are visible. Cells of blast morphology found in association with progranulocytes should tentatively be classed as myeloblasts.

Progranulocyte: Any cell of the granulocytic series which has a nuclear structure too coarse for that of a blast cell and which has not yet developed discernible, specific granules. This term was selected rather than "promyelocyte" because of its clear relationship to the definition of granulocyte, given below, and because the term "promyelocyte" has been in wide use for cells which do contain specific granules. The reason that the terms "granuloblast", "granulocyte" and "metagranulocyte" were not chosen was that the terms "myeloblast" and "myelocyte" were already in general use with essentially the definitions here given. This is true also for the term "granulocyte", which would otherwise have to be synonymous with the term "myelocyte".

Specific granules: Neutrophilic, eosinophilic or basophilic granules. This term does not include azurophilic granules.

Granulocyte: An inclusive term to apply to any cell containing specific granules. The plural form ***granulocytes*** would therefore include all myelocytes, metamyelocytes, band cells and segmented cells whether neutrophils, eosinophils or basophils.

Myelocyte: Any cell containing specific granules, with a round or oval nucleus. It is distinguished from the progranulocyte by the presence of specific granules and from the metamyelocyte by the absence of indentation in the nucleus. It may be further subdivided, at the option of the user, into early and late stages, but the definition of early or late should be clearly stated in any publication.

This and all subsequent cells of the granulocytic series should be additionally characterized as neutrophil, eosinophil or basophil.

Metamyelocyte: Any cell of the granulocytic series having specific granules in the cytoplasm and a nucleus intermediate in shape between that of the myelocyte and the band cell. The nucleus usually has an indented oval shape, resembling a bean or kidney.

Band cell: Any cell of the granulocytic series which has a nucleus that could be described as a curved or coiled band, no matter how marked the indentation, if it does not completely segment the nucleus into lobes connected by a filament. It is differentiated from the metamyelocyte by an appreciable length of the nucleus having parallel sides, and from the segmental neutrophil by having no indentation which could be described as a filament.

Segmented cell: Any cell containing specific granules in which the lobes of the nucleus are connected by a filament. A *filament* is defined as a threadlike structure. Since at times, in viewing a three-dimensional object from one direction, it is impossible to be certain whether two parts of the nucleus are connected by a filament or band, it is suggested that such cells always be placed in the segmented category, since this is the more differentiated and more common cell.

The term *toxic neutrophils*, followed by a 1 to 4+ designation, is recommended for the grading of toxic granules, basophilia of the cytoplasm, vacuoles and condensation of nuclear chromatin in the neutrophils, since its meaning is clear, although it is recognized that it is not an adequately descriptive term. The grading should depend more on the degree of change than on the percentage of the cells involved and should be recorded in the report whenever the degree of change exceeds 2+.

Plasmoblast: Any cell of the plasmocytic series having fine chromatin structure in the nucleus. Cells of blast morphology found in association with proplasmocytes are usually seen only in plastmocytic leukemia or plasmocytic sarcoma. The cytoplasm tends to be more opaque in staining than in the other leukocytic blast cells.

Proplasmocyte: Any cell of the plasmocytic series with a nuclear structure too coarse for that of a blast cell but with one or more nucleoli present.

Plasmocyte: A cell characterized by extremely coarse chromatin structure, with the deeply staining chromatin of the nucleus aggregated into large, sharply demarcated clumps. It is differentiated from the proplasmocyte by the absence of nucleoli. The cytoplasm of all cells of the plasmocytic series tends to be deeply basophilic and opaque in appearance. Azurophilic granules may be present or absent, but are more commonly absent.

Megakaryoblast: Any cell of the thrombocytic series having a nucleus with fine chromatin structure. Usually these are larger than the other blast cells.

Promegakaryocyte: Any cell of the thrombocytic series with a nucleus containing nucleoli, but having a chromatin structure too coarse for a blast cell. The nucleus is usually similar in shape to that of the megakaryocyte. Fine azurophilic granules are usually diffusely scattered through the cytoplasm.

Megakaryocyte: Any nucleated cell of the thrombocytic series in which nucleoli are not discernible. The azurophilic granules are often aggregated into clumps. Megakaryocytes

and promegakaryocytes are typically much larger than other cells found in the marrow.

Thrombocyte: Any cell of the thrombocytic series containing no nucleus; in other words, any non-nucleated fragment of megakaryocytic cytoplasm containing azurophilic granules similar to those of the mature megakaryocyte.

The term thromboplastid was recognized as being anatomically correct, but it was felt that to be consistent with the use of the term *erythrocyte* and to permit the use of "thrombocytic" and "erythrocytic" in describing these cell series, the suffix "cyte" was preferable for these two non-nucleated forms.

Disintegrated cell: Any cell of any series in which the cytoplasmic outline has been disrupted or the nuclear chromatin is no longer surrounded by a membrane, excluding the changes in the nucleus that occur in mitotic division. Disintegrated cells should be recorded as such in the differential report, even though they could be identified by dispersed granules. They should be counted even if only shreds of nuclear material are discernible, since they are undoubtedly included in the total leukocyte count.

It was the decision of the committee that none of the terms in current use for the nucleated cells of the erythrocytic series could be recommended because mutually exclusive definitions for the same term have been used in different schools of hematology; because these are all inconsistent with the terms already recommended by the committee for the other series of cells; and because the use of the suffix *-blast* for the most differential nucleated cell of the erythrocytic series has been a constant source of confusion to medical students and medical technologists, for in all other series *-blast* has been used exclusively for the least differentiated cell. The logical terms *erythroblast, procrythrocyte, erythrocyte* and *metaerythrocyte* were impossible to use because of the wide employment of the terms *erythroblast* and *erythrocyte* with other meanings than would be intended for them in the present recommendations. After considering many suggestions and consulting Latin and Greek authorities, the Latin syllables *rubri*, meaning red, were selected as least likely to be misinterpreted because this stem is familiar in medical terminology, having been used in "polycythemia *rubra* vera" and in the derivation of many other words in which the root *rub* denotes red, such as "*rubi*cund" and "*rube*facient". Other stems considered were the Greek terms *rodo*, rose, *rodino*, rosy, *erythe*, red, *porphyro*, deep-red, *pyrrho*, flame-coloured, and *cirrho*, tawny-yellow, but these were discarded as likely to be more difficult to pronounce and learn.

The best solution that could be found for the problem of clearly indicating the changes in nuclear morphology commonly seen in cells of the erythrocytic and granulocytic series in pernicious anemia and other macrocytic anemias which respond to liver extract and folic acid was to coin a new adjective phrase which could be used to qualify the recommended terms for any of the cells of these two series, or to describe the marrow and blood pictures as a whole. The terms *macrocytoid, macroid, megalo-* and *megaloid* were considered, but none was acceptable to the authorities consulted or to the majority of the members of the committee. The adjective phrase *pernicious anemia type* was recommended by the committee after extensive deliberation, to be used in full in any publication, although in the laboratory and clinic it can conveniently be abbreviated to *P.A.* The use of such an adjective phrase should be perfectly clear and it has the great advantage over *megaloblastic* that it can be applied to cells of the granulocytic as well as of the erythrocytic series and also to the marrow and blood pictures. Eventually, if the anti-pernicious anemia principle is identified and given a short, simple name, a term analogous to *afolic* may be substituted by committee action for the presently recommended adjective phrase.

The names selected by the committee for the stages of differentiation are given in Table III, and their definitions follow. It should be reemphasized, as was pointed out in the first report, that no changes are suggested or implied by these definitions for the criteria in current use for determining the series to which a cell belongs. The recommended definitions are meant to point out only the one essential differential characteristic for determining the stage of differentiation, and they are not intended to be complete descriptions of all cell stages, or of normal and pathologic variants. For these finer details of identification readers are referred to standard textbooks of hematology.

Rubriblast: Any cell of the erythrocytic series having fine chromatin structure in the nucleus. Nucleoli are usually discernible. A stippled chromatin pattern is more common than the lace-net pattern usually seen in other blast cells.

Prorubricyte: Any cell of the erythrocytic series in which one or more nucleoli are discernible in the nucleus and which has a chromatin structure too coarse to be classified as a rubriblast.

Rubricyte: Any cell of the erythrocytic series having definite structure of the nuclear chromatin, but containing no discernible nucleoli. This stage is differentiated from the prorubricyte by the absence of nucleoli in the nucleus and from the metarubricyte by not having a pyknotic, fragmented or partially extruded nucleus. Some may wish to subdivide and qualify this stage—or other stages—further into basophilic, polychromatic or normochromatic rubricytes, according to the amount of hemoglobin present in the cytoplasm.

Metarubricyte: Any nucleated cell of the erythrocytic series having a pyknotic, fragmented, partially extruded or partially autolyzed nucleus. *Pyknotic* describes a dense, solid, structureless nuclear mass. The phenomenon of karyorrhexis or fragmentation of nuclei should be clearly distinguished from the occurrence of double, well-formed nuclei which are occasionally seen in prorubricytes and rubricytes, as well as in other cells which may divide amitotically.

TABLE III.

Recommended Terms and Terms to be Avoided when Referring to Specific Cells of the Erythrocytic Series.

Name of Series.	Term to be Used.	Terms to be Avoided.
Erythrocytic.	Rubriblast.	Erythroblast, megaloblast, pronormoblast, promegaloblast, normoblast, hemocytoblast, stem cell, myeloblast, lymphoidocyte, karyoblast.
	Prorubricyte.	Erythroblast, megaloblast, pronormoblast, normoblast, macronormoblast, macroblast, prokaryocyte.
	Rubricyte.	Normoblast, pronormoblast, macronormoblast, erythroblast, polychromatophilic normoblast, karyocyte.
	Metarubricyte.	Normoblast, erythroblast, metakaryocyte.
	Reticulocyte.[1]	
	Erythrocyte.	Red blood cell, erythroplastid, normocyte, akaryocyte.

[1] It is recommended that the reticulocyte stage be considered a subdivision of the erythrocyte stage.

Reticulocyte: Any non-nucleated cell of the erythrocytic series in which, when supra-vitally stained—usually with brilliant cresyl blue—one or more granules or a diffuse network of fibrils are discernible. All reticulocytes are included under the term erythrocytes, since, without a special stain, reticulocytes are indistinguishable from erythrocytes.

Erythrocyte: Any non-nucleated cell of the erythrocytic series.

Pernicious anemia type: The qualifying adjective phrase to be applied to any cell of the erythrocytic or granulocytic series, and to the marrow and blood pictures as a whole, to indicate the presence of the morphologic changes characteristically seen in pernicious anemia and other macrocytic anemias which respond to liver extract or folic acid therapy. In the nucleated cells of the erythrocytic series the major feature of this change is a relative increase in the pale-staining parachromatin with a corresponding decrease in the deep-staining basichromatin. In the cells of the granulocytic series the characteristic change is the presence of giant forms having very bizarre nuclei, and in the segmented neutrophils the occurrence of many cells with more than five lobes.

Each name recommended for the cells of the erythrocytic series clearly indicates the stage of differentiation. The use of the qualifying adjective phrase, *pernicious anemia type*, with the name of the cell stage will equally clearly indicate that a cell shows the alterations in morphology typically seen in the marrow or blood of untreated pernicious anemia, as contrasted with the corresponding cell which is unqualified as to terminology. Preexisting confusion in the usage of terms for nucleated erythrocytes is thought to be clarified by the recommended terminology as illustrated by the following example: *Megaloblast* as in current use by some hematologists is synonymous with *rubriblast*, as herein recommended and defined, but as used by other hematologists

it is synonymous with the presently recommended term *pernicious anemia type prorubricyte*.

It is, of course, understood that modifying adjectives may be applied to any of the recommended terms in describing results of investigation, but if these terms are to gain general acceptance they should not be given any new definitions except by general action of the committee.

THE BRITISH PHARMACOPŒIA, 1948.

THE following list of corrigenda in the first issue of the British Pharmacopœia, 1948, is published at the request of the British Pharmacopœia Commission. The corrigenda have been prepared by the Commission and approved by the General Medical Council of Great Britain. Copies of the list may be obtained *gratis* by application to the Secretary of the British Pharmacopœia Commission, 44 Hallam Street, London, W.1.

page	*line*		
15	36	*for* 114°	*read* 115°
51	13	*for* 185	*read* 194
	15	*for* 2·0	*read* 3·0
54		*delete* lines 15–19	*insert* **Water-insoluble matter.** Place 1 g. in a stoppered flask with 120 ml. of *water* at 25°, and shake frequently during two hours, maintaining the temperature at 25° throughout; filter through a Gooch crucible, which has been prepared with asbestos, dried at 100° and tared; wash the residue on the filter with 25 ml. of *water*, and dry at 100°; the residue weighs not more than 15 mg.
89 *after* 42			*insert* **Foreign organic matter.** Not more than 2·0 per cent., page 780.
118	9	*for* 97·0	*read* 96·0
122	28	*for* **0·12 to 0·2 G. 2 to 3 gr.**	*read* **0·12 to 0·25 G. 2 to 4 gr.**
153	26	*for* Penicillin	*read* Penicillin
197		*delete* the paragraphs under **Diastatic value**	
258	31	*for* Hexodarditone	*read* Hexobarbitone
300	18	*for* **Ether-insoluble resins, and Acid-value of ether-insoluble resins**	*read* **Ether-insoluble resins and Acid-value of ether-soluble resins**
346	29	*for* 319·9	*read* 373·9
359	7	*delete* below the aqueous layer.	
364	21	*for* +57° to +60°	*read* +36° to +40°
386	3	*for* 3·0	*read* 4·0
440	35	*delete* Each ml. of *N/10 sulphuric acid* is equivalent to 0·02852 g. of anhydrous morphine.	
490	45	*for* uniserial	*read* uniseriate
493		*delete* the paragraph under **Colophony**	
539		*delete* lines 9 and 10	
565	26 and 30	*for* Storax	*read* Prepared Storax
574	5	*for* and	*read* , allow to stand for fifteen minutes and add
	7 and 8	*delete* , after standing for fifteen minutes,	
586	33	*for* prepare	*read* prepared
	34	*for* he	*read* the
629	14	*for* w/v	*read* v/v
654	39 and 40	*for* (approximately 36·5 per cent. w/w of HCl).	*read* diluted with *water* to contain approximately 32 per cent. w/w of HCl.
767	9	*for STORAX*	*read PREPARED STORAX*
784	23	*delete* hydrochloride	
802	14	*for* L† and the L_0	*read* L†/₂ and the $L_0/_2$
	16	*for* L†	*read* L†/₂
	20	*for* L_0	*read* $L_0/_2$
	24	*for* L† and L_0	*read* L†/₂ and $L_0/_2$
	45	*for* L†, L_0	*read* L†/₂, $L_0/_2$
	48	*for* L†, L_0	*read* L†/₂, $L_0/_2$
803	5	*for* L† dose, or 1 L_0	*read* L†/₂ dose, or 1 $L_0/_2$
	8	*for* L†	*read* L†/₂
	10	*for* L_0	*read* $L_0/_2$
808	48	*delete* hydrochloride	
847	17	*for* Storax	*read* Prepared Storax
860	61	*for* L	*read* L†
	64	*for* L†	*read* L†/₂
	65	*for* L_0	*read* $L_0/_2$
873	61	*before* Tetanus	*insert* $L_0/_2$ Dose,
874		*delete* line 3	
		after line 4	*insert* Tetanus Test Toxin .. *802*
890 *after* 30			*insert* Prepared Storax, Determination of Balsamic Acids in *767*
902		*delete* line 50	
after 51			*insert* Storax, Prepared, Determination of Balsamic Acids in *767*

Post-Graduate Work.

THE MELBOURNE PERMANENT POST-GRADUATE COMMITTEE.

PROGRAMME FOR APRIL.

Classes for Higher Degrees and Diplomas.

CLASSES for candidates for M.D. Part I, M.S., D.O., D.L.O., D.G.O., D.D.R., D.T.R.E. and D.A. which commenced at the University of Melbourne in March will be continued in April.

M.D. Part II and M.R.A.C.P.

Clinical demonstrations on thoracic diseases, under the direction of Dr. C. H. Fitts and suitable for candidates for M.D. Part II and M.R.A.C.P., will be held on April 5, 7, 12, 14, 19 and 21, 1949. The fee for this course is £3 3s.

Pædiatric Disorders.

A course in pædiatric disorders, under the direction of Dr. M. L. Powell, will be held at the Children's Hospital, Carlton, on April 26 and 28 and May 3, 5, 10 and 12, 1949. The fee is £3 3s.

Practical Course in Anæsthesia.

One month's continuous course for three candidates, involving an average of five anæsthetic sessions per candidate per week, with a series of eight lectures, will commence at Prince Henry's Hospital on March 28, 1949. The course will be repeated later in the year.

Enrolments.

Enrolments for any of the above courses should be made with the Secretary of the Committee, 426 Albert Street, East Melbourne, two weeks before commencement.

Courses for General Practitioners.

Week-End Course at Sale.

A week-end course will be held at Sale on April 2 and 3, 1949. Dr. D. L. Townsend, Dr. T. H. Steel, Dr. T. Ackland and Dr. J. L. Frew will take part. The fee is £2 2s. Enrolments should be made with Dr. D. I. Fitzpatrick, 52 Cunningham Street, Sale. Telephone 174.

Demonstration at Flinders Naval Depot.

On April 13, 1949, at 2.30 p.m., Dr. D. J. Thomas will give a demonstration on "Recent Advances in the Investigation and Treatment of Heart Disease" at Flinders Naval Depot by arrangement with the Royal Australian Navy.

Clinic at Eye and Ear Hospital.

An eye clinic will be conducted by Dr. Esme Anderson at the Eye and Ear Hospital on Tuesday, April 5, 1949, at 4.30 p.m.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

Course for Final F.R.A.C.S. Examination.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that a course suitable for candidates for the final F.R.A.C.S. examination, to be held in May, will be arranged in conjunction with the New South Wales State Committee of the Royal Australasian College of Surgeons for a period of five weeks beginning April 11, 1949. The course will include clinical demonstrations and a series of lectures in the principles of surgery. Further details may be obtained on application to the Course Secretary, Post-Graduate Committee in Medicine in the University of Sydney, 131 Macquarie Street, Sydney. Telephones: BU 5238-BW 7483.

POST-GRADUATE CENTRE FOR PSYCHOTHERAPY.

THE Postgraduate Center for Psychotherapy, Inc., the training associate of the Institute for Research in Psychotherapy, Inc., has been granted a provisional charter from the Board of Regents of the New York State Educational

Department. It offers intensive training for psychiatrists in psychotherapy leading to certification; also individual courses for general practitioners and non-psychiatric medical specialists in psychotherapy and psychosomatic medicine.

Clinical psychologists and psychiatric case workers are trained in methods that are within the scope of their education and skills, and which can contribute to an integrated programme. The primary aim of the programme is to encourage the development of teams of psychiatrists, psychologists and social workers who can organize and operate community psychiatric clinics.

The courses of instruction include practical demonstrations in psychotherapy as well as lectures. The work of all students is supervised by teachers qualified to manage a specific type of problem. Before the psychiatric student completes his training, he has had personal experience under supervision in the management of various types of cases.

Therapeutic Programme.—The Institute, in close cooperation with the Postgraduate Center, also will carry out a therapeutic programme. This contemplated activity will consist of the extension of clinic services for those who are in need of psychiatric treatment and are unable to afford the fees of private psychiatrists.

Research.—A research programme is in process to study and to evaluate all existing types of psychotherapy. The aim is to shorten treatment methods and to render them more efficient.

Public Educational Programme.—The educational programme is conducted in several channels: for the lay public, the general practitioner, the specialist in other branches of medicine, and the psychiatrist.

Further information on this programme may be obtained by writing to Stephen P. Jewett, M.D., Dean, or to Miss Janice Hatcher, Registrar, Postgraduate Center for Psychotherapy, Inc., 218 East 70th Street, New York 21, New York.

Special Correspondence.

NEW ZEALAND LETTER.

FROM OUR SPECIAL CORRESPONDENT.

New Salary Scales for Full-Time Hospital Officers.

REGULATIONS (Hospital Employment Regulations, 1948, Amendment Number 7) were gazetted on March 3, 1949, and will meet a long-felt need for improvement.

On the administrative side, superintendents-in-chief (where more than one institution is concerned) are to receive £1900 to £2250, and superintendents from £1650-£1900 to £1250-£1500 according to the size and function of the hospital concerned. In some cases an extra of up to £100 *per annum* is allowed where specialist duties, for example, surgery, are included.

Full-time specialists (physician, surgeon, pathologist, radiologist *et cetera*) are graded and paid as follows: principal specialist in employ of Auckland, Wellington, North Canterbury or Otago Boards, £1750-£2000; a senior specialist, £1400-£1700; a junior specialist, £1050-£1350; a medical officer of "special scale", six grades from £1400-£1550 to £800-£950.

The ranks are dependent on higher qualifications and/or length of service in the specialty, and the individual must be designated to the particular rank by the board concerned with the approval of the Minister.

Scales for medical officers of health are not referred to in this gazette.

Comments.

In almost all cases these scales represent an improvement on present rates, and will go a considerable distance towards ameliorating the harsh disadvantages hitherto besetting the full-time officer, as against the general practitioner under social security, and the specialist in private practice. It should now be possible for hospitals to obtain and retain well-qualified men on their full-time staffs.

Two criticisms may be made. (i) The administrative officer is still regarded as more valuable than the full-time specialist clinician at corresponding levels. (Revised salaries for university chairs in medicine, physiology *et cetera*, if any, have not yet been published.) At present few administrative officers can compare with the clinicians in higher qualifications, and almost none have undergone special training for their work. (ii) Although regulations governing annual holiday leave (four weeks) and sick leave are attached, nothing is said about periodic study leave, either for short visits within Australasia or the longer leave of four to six months, preferably with air travel, desirable at intervals of four to seven years. This is a *sine qua non* for high-grade specialist service in New Zealand, and it is to be hoped that substantial help will be planned for this purpose in the near future.

Correspondence.

THE RECRUITMENT AND TRAINING OF NURSES: A MINORITY REPORT FROM ENGLAND.

SIR: May I be permitted to comment on your leader of January 8, 1949, which deals with my minority report on the recruitment and training of nurses?

There are three points to which I should like to draw attention, so as to avoid any misapprehension. In the first place, the content of the document refers only to Great Britain, which is now committed to a policy of full employment and partial planning. I was only concerned to show that the ends already agreed upon here—a planned health service—can only be achieved if certain conditions are satisfied. These conditions include the determination of the correct size and composition of the nursing and other health services. In brief, my thesis is that within the framework of national policy already laid down and approved, the action implied in my analysis is called for.

Secondly, my attempt to give an operational definition of nursing in terms of reducing the incidence and duration of sickness was certainly not intended to limit nursing to the care of the sick person. The emphasis on reducing the incidence of sickness and the repeated references throughout the report to the importance of preventive measures were designed to represent nursing in its most developed form.

Thirdly, I regret that the impression has been given that I am in favour of "directing" women into nursing. I am resolutely opposed to direction of labour in times of peace. If I may quote the opening sentences of Chapter IV (paragraph 83), my position in this matter will be made perfectly clear: "The use of the term 'allocation' is not intended to suggest direction. *Successful allocation without direction is a task for an administration based on scientific principles.*"

Yours, etc.,

JOHN COHEN.

Social Studies Department,
The University,
Leeds.
January 24, 1949.

A NATIONAL MEDICAL SERVICE.

SIR: In order to counteract the socialization scheme of the present Government it is necessary to put forward a scheme equally attractive.

In all social services it is obviously desirable to assist those people who are most penalized under the present system. Of these there are three main categories. Firstly, the mother with more than one child, who, if on or near the basic wage, has to seek medical attention at a public hospital where she has to spend some three, four or five hours in travelling, registering, awaiting medical treatment and finally at the dispensary for medicines; if she has one child, aged four or five, and another one, aged about one or two especially when one or both are sick, or she is sick herself, she has a difficult task to perform.

The second category consists of old-age and invalid pensioners, who are often too ill to attend out-patient departments, assuming they can spend the three or four hours waiting about and necessary travelling and who can ill afford to pay the cost of a visit from a private doctor.

The third group are the people on the lower and middle income brackets who sustain a moderately severe illness costing more than twenty pounds including loss of earning capacity.

The solution for these groups is as follows.

There are approximately 1,100,000 children receiving child endowment, for which the mother has the appropriate book and money orders. It would be very simple to include four vouchers for, say, ten shillings each as part payment of medical treatment and four chemist vouchers of five shillings each which could only be cashed by the mother's signature being attached, as in the case of the child endowment. The total cost of this scheme would be a definite amount of approximately £3,000,000 and not a blank cheque as in the New Zealand scheme.

In the case of the old-age and invalid pensioners extra residents could be put on the staffs of the larger hospitals

and base hospitals, and the name of the hospital to which the patient should apply would be stamped on his pension form. This means that the scheme would be run very cheaply, as the junior medical officers are paid small salaries, and at the same time it would give the young doctors an insight into sociological medicine, which they badly need and which is abundantly displayed in the homes and background of these people. In the final group, where loss of wages and cost of medical treatment and medicines exceed, say, ten pounds or twenty pounds, the Government could provide 50% of the extra cost, or the total cost where a standard of fees, as laid down by the workers' compensation schedule, is charged.

Implementation of these schemes would stop the overworking of the doctors as has occurred in England with the multitudinous trivial complaints. It would not cost the huge sum that is poured out in New Zealand and would overcome the disadvantages suffered by the great majority of people in obtaining medical treatment according to the principles of the British Medical Association.

Yours, etc.,

270 Bondi Road, BASIL WILLIAMS.
Bondi,
New South Wales.
March 4, 1949.

"P.A.S."

SIR: With the probability that para-amino-salicylic acid ("P.A.S.") will become generally available in the near future, it seems incumbent that there should be some indication that, as the result of recent studies, it is apparent that the drug may not be as simple to administer as would appear from earlier reports.

For the past six months, a clinical, bacteriological and biochemical study in the use of "P.A.S." has been conducted at the Repatriation General Hospital, Heidelberg, at the instigation of the Repatriation Commission. Although statistically corrected results of unassailable significance cannot be submitted for publication for some weeks, certain findings must be placed on record as a guide to those administering the drug.

1. *The Lancet* of January 31, 1948, published a letter by O'Connor in which it would appear that there may be doubt as to the purity of different samples of the drug and, as Lehmann has shown that it is only the para grouping which has biological activity, each batch of drug should be biologically assayed so that an indication may be obtained of the amount of the drug present. For the Heidelberg investigation all assays have been carried out against a standard sample of "P.A.S." at the bacteriological laboratory of the University of Melbourne by courtesy of Professor S. Rubbo.

2. During the investigation the dosage was computed so that a half-level of four milligrammes per 100 millilitres could be maintained in the blood. As the excretion of the drug is rapid, the level at the end of one hour must be high and has averaged 13·2 milligrammes for para-amino-salicylic acid and 8·0 milligrammes for the dehydrated sodium salt of para-amino-salicylic acid. After the hour there is a rapid decline in the blood level. For some reason, at present uncertain, and maintaining standard dosage, there is a gradual decrease in the hourly levels during a prolonged course.

3. There are certain changes in the blood picture: (*a*) the white cell count decreases considerably over the first week, but recovers over a period of three to four weeks with similar but more moderate alteration in the red blood cell count and hæmoglobin level; (*b*) the prothrombin levels, as expressed by Fantl's method, show an alarming percentage decrease which is unaltered by the administration of sixty milligrammes of vitamin *K* and excess of vitamin *C*.

4. Brain, liver, lung, kidney and splenic tissue analysis from a post mortem and a small series of experiments with rabbits tend to show levels which exceeded those reached in the blood-stream, indicating some degree of storage by these organs. The dosage in the animals was adjusted in accordance with the relationship of rabbit weight to human weight.

From the preceding four points it would seem that the drug may not be as innocuous as was first anticipated.

As requests have been received from various laboratories for details of the estimation of "P.A.S." in circulating blood, the method in use at the Repatriation General Hospital, Heidelberg, as developed by Miss E. Ferguson, B.Sc., of the pathological department (Repatriation General Hospital, Heidelberg), is described. The principle is the estimation of the amino group by means of Ehrlich's reagent and is an adaptation of the method of Venkataranan (*The Journal of Biological Chemistry*, April, 1948).

Reagents.—(i) Twenty *per centum* paratoluene sulphonic acid ("T.S.A."). Dissolve 200 grammes of the acid in about 600 millilitres of distilled water, stir with activated carbon, filter and make up to one litre; (ii) Ehrlich's reagent two grammes chemically pure paradimethyl amino benzaldehyde in 100 millilitres glacial acetic acid. Add to an equal quantity of 4-molar sodium acetate.

Calibration Curve.—Dissolve 114 milligrammes of dry sodium para-amino-salicylate (equivalent to 100 milligrammes *per centum* of "P.A.S.") in 100 millilitres of distilled water. Dilute this stock solution to give concentrations of 1:10 milligrammes *per centum*. To 7·8 millilitres of distilled water add 0·2 of distilled standard, two millilitres "T.S.A." and two millilitres Ehrlich's reagent. Read in the spectrophotometer at 420 millimicrons against a blank containing eight millilitres distilled water, two millilitres 20% "T.S.A." and two millilitres Ehrlich's reagent.

Estimation.—(i) To 7·8 millilitres *aqua destillata* add 0·2 millilitre serum or plasma. (ii) Add two millilitres "T.S.A." slowly with shaking. (Shake vigorously for a few seconds when the addition is complete.) Filter. (iii) To five millilitres clear filtrate add one millilitre Ehrlich's reagent. (iv) Read in the spectrophotometer at 420 millimicrons.

Notes.—(i) Ehrlich's reagent must be freshly prepared. (ii) The calibration curve should be checked before using a new batch of paradimethyl amino benzaldehyde, as the percentage absorption varies with different brands. (iii) There is no appreciable blank with serum or oxalated plasma. (iv) There is no absorption of "P.A.S." by the protein precipitate up to a concentration of twenty milligrammes *per centum*. (v) The method gave approximately 100% recovery when amounts of five and 100 milligrammes *per centum* were added to serum. (vi) It is possible in most cases to use oxalated capillary blood, as only 0·2 millilitre of plasma is required.

The present study is being continued by the staff of the chest division of the hospital, with the assistance of the pathology department under Dr. R. B. Maynard, and the bacteriology school of the University of Melbourne under Professor S. D. Rubbo. This interim report is submitted with the approval of the chairman of the Repatriation Commission.

Yours, etc.,

ALAN H. PENINGTON.
Specialist in Tuberculosis, Repatriation Commission Headquarters.

314 Collins Street,
Melbourne, C.1.
March 4, 1949.

Bibliography of Scientific and Industrial Reports.

THE following bibliographies, summaries of information and special reports have been prepared by the Council for Scientific and Industrial Research Information Service. Copies may be obtained on application to The Officer-in-Charge, C.S.I.R. Information Service, 314 Albert Street, East Melbourne, C.2. The bibliographies are, in the majority of cases, selective only. Applicants should state clearly the reason the bibliography *et cetera* is requested, because the number of copies available is limited.

B364: "Antihistamines", July, 1948 (107 references).

Australian Medical Board Proceedings.

TASMANIA.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Act*, 1918, of Tasmania as duly qualified medical practitioners:

Oakes, Jean Reid, M.B., Ch.B., 1944 (Univ. Bristol), Bothwell.

Corney, Athol Charles Donne, M.B., B.S., 1947 (Univ. Melbourne), Hobart.

Rowe, Ian Leonard, M.B., B.S., 1947 (Univ. Melbourne), New Norfolk.

Wright, Stanley James, M.B., B.S., 1943 (Univ. Sydney), Queenstown.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of the *Medical Acts, 1939 to 1946*, of Queensland, as duly qualified medical practitioners.

Loughman, Edward, M.B., B.S., 1947 (Univ. Sydney), 16 Stanmore Road, Marrickville, New South Wales.
Fowles, Winifred Lambert, M.B., B.S., 1939 (Univ. Sydney), 58 Bonney Avenue, Clayfield.
Ellis, Howard John, M.B., B.S., 1946 (Univ. Adelaide), c.o. Hospitals Board, Mareeba.
Matthews, Maurice John, M.B., B.S., 1944 (Univ. Adelaide), 48 Guy Street, Warwick.

Obituary.

GERALD WILLIAM SMITHWICK.

WE regret to announce the death of Dr. Gerald William Smithwick, which occurred on February 5, 1949, at Mount Eliza, Victoria.

CHARLES ALISTER McHARDY.

WE regret to announce the death of Dr. Charles Alister McHardy, which occurred on March 11, 1949, at Double Bay, New South Wales.

SIDNEY ARNOLD SEWELL.

WE regret to announce the death of Sir Sidney Arnold Sewell, which occurred on March 12, 1949, at Melbourne.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Knowles, Robert Raymond, M.B., B.S., 1947 (Univ. Sydney), Tullamore, New South Wales.
Foldes, Aladar, registered under Section 17, Paragraph 2, of the *Medical Practitioners Act*, 28 Morrice Street, Lane Cove.
Endelman, Bogumil, registered under Section 17, Paragraph 2, of the *Medical Practitioners Act*, Flat 4, 84 Drumalbyn Road, Bellevue Hill.

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association:

Pitcher, Russell Barton, M.B., B.S., 1948 (Univ. Adelaide), 39 Cross Road, Kingswood, South Australia.
Hobbs, Ian Harrold, M.B., B.S., 1948 (Univ. Adelaide), Paynham Road, Paynham, South Australia.
Dunstone, Max Warwick, M.B., B.S., 1948 (Univ. Adelaide), Royal Adelaide Hospital, South Australia.
Thomas, Brian Gordon, M.B., B.S., 1948 (Univ. Adelaide), Box 121, Port Lincoln, South Australia.
Steale, Ian MacDonald, M.B., B.S., 1948 (Univ. Adelaide), 6 Mosely Street, Glenelg, South Australia.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association:

Doherty, William Valentine, M.B., B.S., 1947 (Univ. Sydney), 88 Wycombe Road, Neutral Bay.
Fitzhardinge, Julie Maude, M.B., B.S., 1947 (Univ. Sydney), 47 Darley Road, Randwick.
Fraser, Bruce St. Pierre, M.B., B.S., 1948 (Univ. Sydney), Sydney Hospital, Sydney.
Heller, Edgar Herbert, M.B., B.S., 1948 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.
Lister, Harvey Alexander John, M.B., B.S., 1944 (Univ. Sydney), 13 Union Road, Auburn.
McLachlan, Colin Stewart, M.B., B.S., 1948 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.
Murray, Valerie Ruth, M.B., B.S., 1948 (Univ. Sydney), Lithgow District Hospital, Lithgow.
Peipman, Eskil Vaino, M.B., B.S., 1942 (Univ. Sydney), 2A Park Street, Clovelly.
Wechsler, Zacharias, registered in accordance with the provisions of Section 17B of the *Medical Practitioners Act*, 1938-1945, Broughton Hall Psychiatric Clinic, Wharf Road, Leichhardt.

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

Hetzel, Peter Stuart, M.B., B.S., 1948 (Univ. Adelaide), 3 Newcastle Street, Heathpool, South Australia.
Way, Meville James, M.B., B.S., 1948 (Univ. Adelaide), Royal Adelaide Hospital, South Australia.

Diary for the Month.

MARCH 29.—New South Wales Branch, B.M.A.: Council Quarterly.
MARCH 31.—New South Wales Branch, B.M.A.: Annual Meeting.
MARCH 31.—South Australian Branch, B.M.A.: Clinical Meeting.
APRIL 1.—Queensland Branch, B.M.A.: Branch Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federal Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

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